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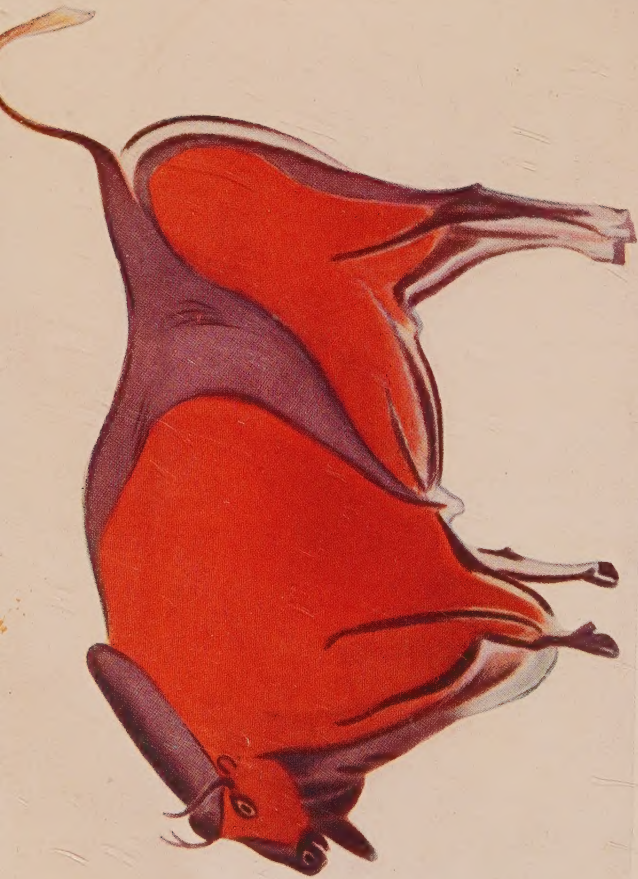
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PALEOLITHIC PAINTING OF A BISON FROM THE ALTAMIRA CAVE.
AFTER BREUIL.

THE STONE AGE

BY

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TO
MY SON BASIL

PREFACE

IT was with some hesitancy that I acceded to the request of the publishers to write this small volume on the Stone Age, partly owing to other literary commitments, but also because not many years ago I published a rather larger work on this subject. On reflection, however, it seemed that the progress of research during the seven years that have intervened since my book appeared, justified an attempt to tell again the fascinating story of early man in the light of the latest information available. Moreover, I have now visited most of the more important prehistoric sites in Western Europe, and some of the less-known stations, thereby having had an opportunity of reconsidering the old problems and the new evidence on the spot.

It is impossible, of course, for a writer who is himself engaged in specialized research to be entirely free from a mental bias resulting from his own investigations, but in these pages I have tried to state the facts rather than to urge theories to account for them. Prehistoric archæology is still a young and somewhat speculative science; therefore, as it seems to me, future research is hindered rather than helped by setting before the general reader and the immature student dogmatic statements and hypotheses (however ingeniously they may be argued) which, with the completion of knowledge, may have to be abandoned or at least modified. It is most certainly the business of the scientist to form judgments on the data available at a given time, but in a book of this character the author may well pass a self-denying ordinance on himself in a free use of the

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scientific imagination. Therefore, I have endeavoured to concentrate on evidence rather than interpretation, and when from time to time probable conclusions have been suggested, my aim has been to state the case in a manner calculated, I hope, to induce the reader to work out the problem for himself. By adopting this method, I have tried to strike a mean between "running a theory" and merely popularizing currently accepted views. How far this has been accomplished must be left to the reader to decide.

The greater part of the book should prove easy reading to any person of ordinary education, as no previous knowledge of the subject is presupposed. Although I have not had the requirements of children in my mind in preparing the MS., the Quennells having already supplied the juvenile section of the public with admirable books on the subject, the volume should not be beyond the comprehension of the adolescent. To put this to the test, I gave my son, who is in his first year at a public school, two of the more complicated chapters to read, and he appears to have found them quite intelligible. Repetition has been inevitable in the interest of clearness, but this has been minimized by the addition of a glossary in which technical and unusual terms are defined.

If a volume of this nature is to be of any permanent value to the serious student, the language of the larger textbooks must be maintained; otherwise it would fail in its purpose as an introduction to more detailed study. For the same reason it is impossible to avoid a discussion of technical questions, such as those relating to origins, chronology and migrations. Frequently these matters are in themselves complicated, and they are rendered even more complex by a conflict in expert opinion. Those to whom the subject is quite unfamiliar may be advised to read the work as a whole first, noting the sections which make a more serious claim on the attention. On a second reading, when some knowledge of the more technical matters has been gained,

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the problems should be worked out in greater detail, reference then being made to the larger treatises enumerated in the bibliography at the end of each chapter. In this way a competent knowledge of the subject will be gained, and independent judgments may be formed.

In conclusion, I wish to express my indebtedness to the many workers in this field of research whose labours have made this volume possible, and to whose published works I have had frequent recourse. In the absence of documentation, it has not been possible to indicate these obligations in the text, but the books consulted are included in the bibliographies as well as other important works bearing on the questions under discussion. Especially am I grateful to those scholars who have assisted in the preparation of the MS., and particularly to Dr. Marett, Mr. M. C. Burkitt, Mr. W. J. Perry, and Mr. Harold Peake for their invaluable suggestions and criticisms on many points. Professor Percival has also kindly given me the benefit of his profound learning as a grain specialist. My friend and colleague, the Rev. A. Mallinson, has made many useful suggestions in rendering the book more intelligible to the general reader, and the dedication expresses a similar debt. Mr. S. Cook of the University Observatory generously undertook the laborious task of proof-reading. Lastly, to my wife and partner in this work, something more than a formal recognition is due inasmuch as she has taken upon herself the arduous task of drawing all the plates, except Figs. XXXIII., XXXVII., and XXXIX., which are reproduced from photographs, and the frontispiece, for which I am indebted to M. l'Abbé Breuil for permission to reproduce his splendid Altamira paintings. In addition to this, and all the help she has given me in the text itself, year after year Mrs. James has been ever ready to accompany me on archæological expeditions, often into remote, perilous, and distinctly uncomfortable places. Thus in the cause of archæological research she

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has sacrificed her own literary and artistic tastes, and by her linguistic accomplishments enabled me to penetrate regions into which probably I should not have ventured without her companionship.

E. O. JAMES.

OXFORD.

February, 1927.

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A GLOSSARY OF THE TERMS COMMONLY USED IN PREHISTORIC ARCHÆOLOGY

- Achen**, the name given to a temporary retreat of the ice while the last glaciation (Würm) was diminishing in extent.
- Acheulean**, the second division of the Palæolithic flint culture, deriving its name from St. Acheul, near Amiens.
- Alignment**, a series of standing stones arranged in a row.
- Ancylus**, the name given to the Baltic Sea when it was a land-locked fresh-water lake, harbouring in its waters a little mussel known as the Ancylus.
- Asturian**, a transitional culture in Asturias or Oviedo in North Spain, characterized by a peculiar pick made from a river pebble.
- Aurignacian**, the flint, bone, and horn industries of the second of the Palæolithic cave periods.
- Azilian**, a transitional culture found chiefly in the Pyrenees, belonging to the phase which immediately succeeded the close of the Palæolithic.
- Barrow**, a large mound of earth or rubble covering a grave or burial-chamber composed of large unhewn blocks of stone.
- Boulder-clay**, clay deposited by ice made up of fragments of boulders of stone ground off during the passage of glaciers.
- Breccia**, a coarse rock made of pieces of stone broken from other rocks and cemented together by fine mud or sand.
- Bühl**, a temporary glaciation between the Würm advance and the establishment of the present climate.
- Campignian**, a transitional or early Neolithic culture deriving its name from pit-dwellings at Le Campigny in France.
- Capsian**, a North African flint culture similar to the Aurignacian in Europe.
- Chellean**, the first division of the Palæolithic flint culture.
- Coup-de-poing**, a pointed hand-axe typical of the Chellean industry at the beginning of the Palæolithic period.
- Crô-Magnon**, the name given to an important sub-group of the earliest representatives of modern man (*homo sapiens*) living in the later part of the Palæolithic period.

GLOSSARY

- Dolmen**, a burial-chamber built of three or more upright blocks of unhewn stone covered by a capstone.
- Drift**, the glacial gravel deposit carried along by rivers after a general thaw following a glaciation.
- Dynastic**, the period of Egyptian history beginning with the establishment of the Monarchy about 3300 B.C.
- Eolith**, or "dawn stone," a chipped piece of gravel, thought by some archæologists to represent the earliest human implements.
- Glacial periods**, the epochs during which the Northern Hemisphere was in great measure covered intermittently by ice-sheets. These advances of the glaciers are known as *glaciations*, while the warm intervals during a retreat of the ice are called *interglacial* phases.
- Günz**, the first glaciation in Palæolithic times. (*Cf.* Glacial period.)
- Günz-Mindel**, the first of the Palæolithic interglacial phases.
- Homo sapiens**, modern types of the human race which first appeared in Aurignacian times, and distinct from the earlier Neanderthal and Piltdown species.
- Lake-dwellings**, settlements erected on piles in a lake.
- Levallois flakes**, broad triangular flint flakes worked on one side only, named after Levallois-Perret, near Paris, and belonging to the Mousterian industry from its earliest phases.
- Littorina**, the name given to the periwinkle, and therefore to the shell mound culture in Scandinavia, because of the predominance of its shells in the heaps.
- Loess**, a deposit of fine yellowish-grey or brown sandy loam superimposed on river gravels by wind action during the glacial period.
- Magdalenian**, the last stage of the Old Stone Age, characterized by long ribbon-like flakes, graving tools, and objects in bone, horn, and ivory, together with the highest development of cave art.
- Maglethorsean**, a transitional culture representing the earliest settled inhabitants of the Baltic region, deriving its name from a bog in Zealand.
- Megalithic monument**, a prehistoric structure made of large blocks of unworked or slightly worked stone, invariably used as a tomb.

GLOSSARY

Menhir, a single standing stone.

Mesolithic. See Transitional.

Microliths, minute flakes carefully trimmed, sometimes called "pygmy flints."

Mindel, the second of the glaciations during the Palæolithic period.

Mindel-Riss, the second interglacial phase.

Montierian, a name sometimes given to the Levallois industry of the Riss and Riss-Würm periods.

Mousterian, the flint industry, composed almost entirely of flake implements, that prevailed during the first cave period.

Neanderthal, the name given to a very primitive-type of man inhabiting Europe during the first cave period, and apparently contemporaneous with the Mousterian flint culture.

Neolithic, the later or New Stone Age, which followed the transitional cultures, and was characterized by the beginning of agriculture, domestication of animals, and many of the higher arts and crafts.

Palæolithic, the Old Stone Age, which began with the Pleistocene period of geology, and during which man lived by hunting.

Pleistocene, the fourth or Quaternary geological age, contemporaneous with the glacial and Palæolithic periods.

Pointe à cran, delicately flaked triangular flint blades having a tang or shoulder, found in the Upper Solutrean deposits.

Pre-Chellean, flint implements found in deposits belonging to a time prior to the Chellean phase.

Pre-Dynastic, the period in Egypt preceding the establishment of the Monarchy.

Pre-Palæolithic, the earliest division of the Old Stone Age prior to the coming of the ice and the Palæolithic culture.

Pygmy flints. See Microlith.

Racloir, flint side-scraper.

Riss, the third advance of the ice during the Pleistocene period.

Riss-Würm, the third interglacial phase.

Rostro-carinate, a flint, thought to be an implement, resembling the beak of an eagle, found in pre-Palæolithic deposits in East Anglia.

Sarsen, blocks of sandstone found in the valleys between Swindon and Salisbury.

Scraper, flat backed flint implement, probably used for scraping skins, etc.

GLOSSARY

Solutrean, the highly developed flint industry occurring between the Aurignacian and Magdalenian cultures in Central Europe and France.

Stone Circle, a ring of standing stones.

Strépyan, a pre-Chellean flint industry.

Tardenoisean, a microlithic transitional culture allied to the Azilian, and having affinities with Capsian types.

Terrace gravels, a deposit of gravel left along the sides of the valley after a general thaw at the end of a glaciation.

Terramare, pile-dwellings on land found in Italy.

Tertiary, the third of the geological ages, characterized by the appearance of the mammals, and possibly the period in which man evolved.

Tortoise-core, a piece of flint shaped like a tortoise from which flakes are struck.

Transitional, the cultures between the Palæolithic and Neolithic periods, during which man still hunted or gathered his food.

Truncated flakes, flakes reduced in size by subsequent working.

Würm, the fourth glaciation.

THE DIVISIONS OF THE STONE AGE

DIVISIONS OF THE STONE AGE

<i>Culture.</i>				<i>Geological Age.</i>		<i>Race.</i>
Eolithic	...	...	...	Tertiary era		Pithecanthropus
Lower Palæolithic:				Quaternary or Pleistocene:		
Pre-Chellean	...	...	...	Günz glaciation	}	Pitdown
				Günz-Mindel		
Chellean	...	...	...	Mindel glaciation	}	Heidelberg man
Acheulean	...	...	...	Mindel-Riss		—
Middle Palæolithic:	...	...	...	Riss glaciation		
				Riss-Würm		
Mousterian	...	...	...	Riss (?)	}	Neanderthal man
				Riss-Würm		
Upper Palæolithic:	...	...	...	Würm glaciation		
Aurignacian	...	...	...	Aachen interglaciation	}	Crô-Magnon man and allied sub-groups
Solutrean	...	...	...	Bühl glaciation		
Magdalenian	...	...	...
Transitional period:						
Capsian	...	...	...	Gschnitz	}	Forerunners of modern races
Azilian	...	...	...	Daun		
Tardenoisian	...	...	...	Recent		
Asturian	...	...	...
Maglemosian	...	...	...
Campignian	...	...	...
Shell mounds	...	...	...
Neolithic period:						
Neolithic agricultural civilizations and dawn of metal era in third millennium B.C.				...	...	Alpine, Nordic, and Mediterranean races

THE STONE AGE

INTRODUCTION

ONE of the earliest questions asked by an intelligent child is: "How was this made?" or "Where did that come from?" And this spirit of inquiry does not cease when the child becomes a man and puts away childish things, for the desire to probe into the life history of the world as we know it and of its inhabitants is always with us, though it may be more apparent in some people than in others. In olden days when questionings of this kind arose, generally the answer had to be invented owing to the absence of any very definite information about the past. This led to many speculations (as is still the case among modern primitive races), and these explanations in course of time came to be regarded as history. Nowadays, however, intelligent people are not content to accept traditional interpretations of the unrecorded past. We live in a scientific age, and it is the business of science to ascertain facts and determine authentic history by accurate observation and inductive reasoning—in other words, to find out the truth so far as possible, and not to make up the answers from our own imagination.

When the scientific method is applied to history, it is a comparatively simple matter to arrive at a more or less accurate estimate of the series of events that have happened, provided we have some data to work upon, but when the sources of reliable information run dry the problems begin. Suppose, for instance, that we are trying to discover the true history of our old school,

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or of the home where we and our ancestors lived, or of the parish church in which we were baptized and confirmed; so long as we can find written records bearing upon our investigation, all is well, but the farther we go back the fewer and obscurer become the references at our disposal, till at last we can find no mention at all of the object of our quest. Clearly we have now reached the source of this stream of our evidence, and if we would continue the search we must devise other means to traverse the uncharted wilderness. It is at the point at which written records are no longer available that we enter the domain of "pre-history," to employ an unsatisfactory but generally accepted term for the period before the time of writing. Here we part company with the historian, since he bases his researches mainly on written documents, and take as our guide the prehistoric archæologist who studies the peoples of antiquity and their mode of life, beliefs, and practices from a great variety of objects or fragments of objects, used by man before the time of inscriptions and other literary records. It is he, in fact, who provides the historian with his scenery and stage properties, for, even in countries which have preserved written accounts of their past, an archæological background is still required to set off the two or three historical characters before the footlights.

Archæology, then, is a branch of the study of the whole history of man in evolution, this latter subject being of such importance that it has now become a separate science designated "Anthropology." But to understand the story of man in its true perspective we must have some knowledge of the vast epochs which preceded the establishment of man on the earth, and out of which the human race emerged. Here the geologist comes to our aid, for it is he who studies the records of the rocks. Not many years ago it was believed that the entire universe had only been in existence about six thousand years, and on this hypothesis there was no room for a prehistoric period, to say nothing of a long

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series of geological ages in the development of creation, because the whole event took place within the space of six days, the details of which are recorded in the opening chapter of the Bible.

Since the middle of the last century, however, a number of discoveries have been made which have entirely altered our whole conception of the nature and history of the universe, and we now know that, so far from creation being a matter of yesterday, it really goes back in origin to such a remote period that it cannot be ascertained with any degree of accuracy. Lord Kelvin estimated the age of the earth at 20,000,000 years, but in the light of the latest knowledge this estimate has to be very much increased. Even man himself has lived so long on the earth, tens of thousands of years before he invented writing as a means of recording his doings, that the actual beginnings of his terrestrial life are lost in the mists of time. The charming poetic descriptions of creation preserved in the Book of Genesis are, of course, comparatively modern documents, in their present form dating from the eighth century B.C., and later, when the priests and prophets in Israel took the ancient creation legends current at the time in Palestine and Babylonia, and without materially altering their mythological character, made them the means of teaching the unchanging verities respecting the nature of God and man, having first removed the grosser elements in the original stories. To mistake the creation stories, which reflect their teaching on the moral and religious side, for scientific statements of fact is to do them an injustice almost as great as to deny them a place in inspired literature. Their real and permanent value lies in their having been made a vehicle for conveying to more enlightened generations instruction about matters above and beyond the realms of scientific investigation. But they cannot throw any light on the early history of the universe and the beginnings of the human race.

THE STONE AGE

While theologians have been showing us how to read the Old Testament Scriptures more intelligently and explaining their true significance, scientists have been trying to put together all the new knowledge which has recently come to light concerning the visible universe. It is now apparent that everything around us has a history behind it: the solar system, the earth, with the rocks that compose it; the plants and animals living upon it; and man himself and his institutions—all must be seen as the outcome of a long process of evolution. The astronomers have shown us how the earth separated out from the gigantic glowing mass of matter (or possibly it was a cloud of meteorites) which originally constituted the solar system. As this new-born planet cooled, the crust shrank, while some of the molten matter from below forced its way through the outer surface, the lighter materials, such as granites, coming to the top, and the heavier materials (basalts, etc.) remaining deeper down. Thus the continents are made of the lighter rocks, and the heavier substances compose the beds of the oceans. At first apparently the earth had no atmosphere, and it was a long time before water fell upon it in the form of rain. When this occurred, however, the salts in the surface rocks dissolved out, so that not only did the sea become salt, but the ancient crust, through the action of air and water, gradually was worn away on the high grounds. The sediments thus formed were carried away by rivers and seas, to be laid down again elsewhere as deposits, in course of time to become the sandstones and other sedimentary rocks, which in some places are said to be sixty miles in depth.

While these sediments accumulated, a process occupying an enormous length of time, the earth brought forth all manner of living creatures, great and small, as well as a luxuriant vegetation. The remains of these animals and plants would naturally become embedded in the sedimentary rocks, and in this way they have been preserved in the form of fossils throughout the

INTRODUCTION

subsequent ages. Herein lies the opportunity of the geologist, whose business it is not only to ascertain what the crust of the earth is made of, and how it was laid down, but also to work out by means of the fossil contents of the rocks the history of the various kinds of life that inhabited it in each era. Furthermore, by estimating the annual amount of weathering now going on in a given district and comparing it with the thickness of the sedimentary rocks, the age of the deposit can be approximately determined. Thus, by the aid of these "rock records," the history of the earth from the earliest times has been traced with remarkable accuracy, the whole being divided into five "ages," of which the first two are called the Primary, or Palæozoic, and the Secondary, or Mesozoic (*i.e.*, the "middle ages"). The third is known as the Tertiary, or Cainozoic, and the next as the Quaternary, or Pleistocene, at the close of which the modern world may be said to have begun. Each of these periods is subdivided into several epochs, based chiefly on the distinctive types of fossilized forms found in the rocks. The following table sets forth briefly the various stages in this development from the formative ages and the earliest appearance of life in the so-called protozoa or permanent germ-cells, and the backboneless (invertebrate) "worms" whose tracks have been observed in the rocks of the Archæan period before the Primary age proper began, to the fishes in the Silurian, and Amphibians in the Carboniferous, when the coal-fields were laid down. As a result of the great experiment of the amphibians in leaving the shelter of the water and venturing to make a temporary abode on the land, strange and gigantic reptiles appeared in the Secondary period when the great limestone formations were deposited. These were followed by birds with reptilian teeth, and wings with claws. Models of these strange creatures may be seen in almost any good museum, and they have recently been well depicted in a fantastic film entitled "The Lost World." At the end of the

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Geological Age	Sub-Periods.		Rock Depth.
Recent period Quaternary period	Pleistocene period	Human civilization	200 feet
Tertiary, or Cainozoic, age	Pliocene Miocene Oligocene Eocene	{ Emergence of man, elephant, rhinoceros, etc. { Higher mammals, modern fish, butterfly- flies, flowering plants	200 feet 1,000 feet 500 feet 800 feet
Secondary, or Mesozoic, age	Cretaceous Jurassic Triassic	Primitive mammals, coral reefs Birds and flying reptiles Giant reptiles (dinosaurs, etc.)	1,500 feet 5,000 feet 3,000 feet
Primary, or Palæozoic, age	Permian Carboniferous Devonian Silurian Ordovician Cambrian	Reptiles Forests, insects, amphibians Larger fish, ferns Sea-scorpions, fish with jaws Invertebrates Sponges, corals, crustacea, protozoa, "worms"	1,500 feet 12,000 feet 5,000 feet 7,000 feet 15,000 feet 12,000 feet
Formative times	Archæan. Formation of rocks. Beginning of atmosphere and cooling of earth. Establishment of solar system from primeval nebula.		

INTRODUCTION

“ middle ages,” or *Mesozoic*, came the mammals in their most primitive form. In the Eocene, at the beginning of the Tertiary period, some of these died out as a result of having developed the common and fatal complaint of over-specialization, but the majority survived. It was from this stock that man himself at length emerged.

It is only with the last two of these geological ages, the Tertiary and the Quaternary, that we are concerned in this book, because it was not until these later times that man and his precursors appeared. Exactly when the human race emerged we do not know for certain, but it was not before the Miocene sub-period of the Tertiary era, and many people think it was later still, in the Pliocene or at the very beginning of the Quaternary age in the Pleistocene, that the stupendous event occurred. Since the phase of human culture called *the Stone Age* represents the earliest attempts of man to develop a handicraft, its time and the place of its commencement must depend on the antiquity of man, if it be granted that from the beginning he was a tool-making animal. At present the gradually accumulating evidence from various sources is tending to push the human race farther and farther back into the Tertiary, as will be shown in the next chapter, and, consequently, to make the Stone Age of greater and greater antiquity. Hitherto archæologists have generally employed the word *Palæolithic* to denote the Old Stone Age, which they have thought began with the Pleistocene period of geology (*i.e.*, the Ice Age) ; while the term *Neolithic* has been reserved for the later or New Stone Age which followed the final disappearance of the ice to the Arctic Circle, and marked the beginning of agriculture, the domestication of animals, and other higher developments of culture. This division, however, as will appear later, is really arbitrary, though it would only make for confusion to adopt a new nomenclature in a book that aims chiefly at leading the reader on to study the larger works and then to think for himself. Moreover, since

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we have yet to discover definitely human remains that can be placed with certainty in the Tertiary, it is perhaps as well at present to retain the expression "Pre-Palæolithic" for the flint implements found in the earlier deposits which seem to represent the rudimentary stages of the Old Stone Age. When we have found the men who fashioned these tools, doubtless we shall then discover a more satisfactory name for the work of their hands.

CHAPTER I

THE DAWN OF THE STONE AGE

IT is now quite clear that while man undoubtedly emerged from mammalian stock, he did not arise from any of the known man-like apes (gorilla, chimpanzee, orang-utang, and gibbon). It appears, in fact, that the human ancestors separated from the parent stem before the time when the anthropoid apes established themselves as a distinct family, probably in the Miocene epoch when the direct ancestors of most of the modern animals came into being (Fig. 1A). It was at the dawn of the human period that the gigantic mammals died out, though the rivers still swarmed with the rhinoceros and hippopotamus, while packs of primitive dogs, as big as bears, and wolves hunted in the prairies, where also the early forms of the elephant, such as the mammoth (the most famous of all prehistoric animals, and especially prominent in the cave period of the Pleistocene), with its long spiral tusks, pendent ears tufted with hair, and long black mane, roamed in company with the giant mastodon. In the trees fierce cat-like creatures sought safety, and ranging the woods were troops of huge deer, a massive-headed ox, and the great elk; while behind boulders lurked the dreaded sabre-toothed tiger, eager for his prey. In the dim recesses of the caves the bear watched over her cubs, and the lion and hyæna lay in wait among the thickets, ready to spring upon the herds of antelopes hurrying to the water. Such were the companions of man at the beginning of the Stone Age.

At the end of the Tertiary era the temperature in Europe was warm and moist. Britain at this time was still part of the Continent, and where the English Channel now divides England and France was a beauti-

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fully wooded valley, while herds of mammoths might be seen during the Old Stone Age grazing on the swampy plains between Harwich and the Hook of Holland. Palæolithic man, therefore, was not perplexed by the Channel-tunnel problem, and he escaped the struggles of the Custom House at Dover and Calais, but, nevertheless, his passage across the valley and the plain was not without its terrors. Life for early man, in short, was a struggle for existence, and the ultimate triumph of the human species is one of the most remarkable episodes in the history of the universe. In the forthcoming pages we shall trace the main lines of this wonderful achievement within the limits of the prehistoric period, but in order to understand the ascent of man we must first try to unravel the mystery of his descent.

THE ORIGIN OF MAN.—Our earliest ancestors must have lived a precarious life for thousands of years, being surrounded by fierce beasts of infinitely greater physical strength than a human being ever can have possessed, and themselves equipped with very inadequate means of defence. It is, in fact, little short of miraculous that man was able not only to survive under these circumstances, but also to gain dominion over the rest of creation. Small wonder, then, that an ancient seer, pondering over these strange phenomena, should see in them a Divine intervention, and if today we are able to give other reasons for the emergence of man and his subsequent mastery of his surroundings, who would be so bold as to deny the presence of a "hidden Hand" and a Divine purpose in the fashioning and equipment of the highest of created beings? With these higher realities the scientist is not concerned, but the wonderful story of human progress in prehistoric times gives food for thought to the philosopher and the theologian, as well as to those of us who are merely engaged with the archæological and geological evidence. It is also true, however, as Darwin remarked in the very fine passage with which he closed *The Descent of Man*, that "man,

with all his noble qualities, with sympathy which feels for the most debased, with benevolence which extends not only to other men, but to the humblest living creature, with his God-like intellect which has penetrated into the movements and constitution of the solar system—with all these great exalted powers—man still bears in his bodily frame the indelible stamp of his lowly origin.”

Thus the human skeleton is similar in many respects to that of the anthropoid apes, while within the body there are such apparently useless, and, under certain conditions dangerous, organs as the vermiform appendix at the place where the small intestine joins with the large. In the gorilla and orang this *cul de sac* is very much longer than in man, and in monkeys it is a blunt conical point. In some animals, like the rabbit, the blind gut is the largest organ in the body, and comes to an end in the appendix. The lemurs, on the other hand, have a true appendix like that in the human body. Rudimentary, or “vestigial,” structures, as these relics of an animal ancestry are called, always tend to vary in different species, and they have an unhappy knack of going wrong, like most things that have fallen into disuse. There are in all, it has been estimated, over a hundred of these organs in the human body, of which the muscles which enable some people to move their ears, and the conical point sometimes seen on the margin of the ear-trumpet, or pinna, corresponding to the tip of the pointed ear of rabbits and other lower mammals, or the four imperfectly formed vertebræ at the end of the backbone, representing the remains of the tail in other animals, may be quoted as examples. If man were a separate and independent creation these survivals would be quite inexplicable, and they could only be regarded as blemishes and blunders, but as the remains of earlier structures, useful in a former mode of existence, they are understandable and of great historical interest, like the two buttons on the back of the waist of a frock-coat, originally employed for fastening up the tails when riding horse-back, or the

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shortened cassock or "apron" still worn by bishops, notwithstanding the fact that a car has long since replaced the episcopal horse in diocesan visitations.

Another proof of man's relationship with the rest of the animal world is afforded by the pre-natal development of the human embryo. Before a baby is born it passes through all the principal stages in the evolution of man from the unicellular organism or egg-cell, through the fish and reptile order, to that of the higher mammals. The body is covered with hair until three months before birth, and the rudimentary tail or "coccyx" is very prominent and movable. On the sides of the neck there are four pairs of slits corresponding to the gill-clefts which enable fish and amphibia to breathe in water. Even after birth an infant is able to hang on to a stick just as a monkey supports itself by clasping the branch of a tree. There is, however, a very important consideration to bear in mind in this connection, and one which is frequently forgotten in stating this well-known evidence. It is only with *embryos* of these species, and not with the actual animals, that a comparison is possible; and, moreover, throughout the development, the human embryo retains an individuality of its own. Sometimes babies are born in an imperfect state of growth, but they are nevertheless always human beings, however much they may reveal in their features and ways an earlier stage of evolution.

The real secret of man's greatness and his ultimate triumph in the race for supremacy lies in the fact that, during the long process of development, he attained certain characteristics which enabled him not only to hold his own with his formidable companions and survive them, but which also secured for him his unique position in the universe. As far back as the beginning of the Tertiary age there are signs of the evolution of a higher type of brain among some of the mammals. The gigantic reptiles of the previous period had enormous bodies but ridiculously small

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brains, and consequently, like all creatures that have become over-specialized, they proved to be unprogressive till ultimately they became extinct. This shows that size and weight are not the chief factors in the struggle for existence. Some mammals, like the rabbit and the beaver, living a humdrum life in uninspiring surroundings, are by no means quick-witted, but the possibilities of the mammal mind apart from contact with human beings are seen in the dexterity of the shrew, the squirrel, the fox, and the otter. Life in the trees makes for agility, and develops the senses of sound, sight, and touch, which produce corresponding changes in the brain capacity. When the fore-limb becomes a free hand, as in the case of the monkeys, there is again a relative mental improvement, stimulating a restless inquisitiveness, a desire to investigate the world, and launch out in various directions. The dawn of reason and intelligence is fast approaching at this point.

If, as seems very probable, the direct ancestor of man lived in the trees instead of grubbing along on all fours on the ground, the chief human characteristics must have developed under "arboreal" conditions. This doubtless explains why the fore-arm of man has never been a supporting structure like the fore-leg of the horse or the dog, because in the trees the fore-limb had to be used for gripping the branches, gathering the food supply, and consuming it when collected. After the hand had emerged, the development of the thumb soon followed, and this enabled things to be grasped more readily and securely. Just as today the mental powers of dull children are frequently stimulated by a course in handicraft, so the freeing of the hand in the Tertiary age must have reacted on the growing brain of the human ancestor. Again, the important change which was taking place in the eyes of some of the mammals at this time made for a higher mentality. In the lower animals the eyes only see things directly in front of them; but man has acquired the power of focussing

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an image so that each eye independently gets the impression, thereby allowing him to see an object by moving the eyes without altering the position of the head. This stereoscopic vision, of course, is an enormous advantage, since it enables a creature to get a more complete view of its surroundings, and helps him to perform movements of the hands and of the whole body with greater rapidity and accuracy. In these ways a fuller understanding of the outside world is obtained, and this leads to an ever-increasing store of mental impressions. In short, the brain in mammals differs from that of all other animals in having a sort of recording apparatus for storing up the impressions of the senses, and at a moment's notice translating them into muscular actions. Hence their power of accommodating themselves without delay to the requirements of their circumstances, and readily adapting themselves to a new mode of life. It was doubtless these new developments which first led some of them to make venturesome excursions into their environment, and in case of need to seek safety in the trees.

We know that in early Eocene times there emerged small squirrel-like animals similar to the tree-shrews which may be seen sitting in their haunches holding in their fore-paws insects and fruit gathered from the trees. The best example of these vivacious, large-brained creatures for our purpose is a little animal called *Tarsius* which lives in the Malayan islands and has remained practically unchanged since its ancestors (*anaptomorphus*) emerged early in the Eocene. Its most striking feature is its huge eyes, and although it is compelled to move its head to bring both of them into focus, it is able to do this so rapidly in any direction that it is hardly hampered at all by its "binocular vision." It is very agile, and has a large brain in the front part of which can be detected the beginnings of the seat of all the higher mental faculties—the "pre-frontal region," "the crowning glory and distinction of the human fabric." In *Tarsius* this area is found only in such a very rudi-

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mentary state that it cannot be of much assistance in thinking out complicated ideas, as is the case with man, but nevertheless it represents the germ of human intelligence. Therefore, if *Tarsius* is a fair representative of the original common ancestor of man and the apes, as he is generally thought to be, then the evolution of the human brain seems to have begun as long ago as the Eocene epoch at the dawn of the Tertiary era.

As time went on, other types apparently separated out from the human stem, and developed special characteristics of their own, which either helped or hindered their progress. The monkeys first appeared, and for the most part continued in the way of all-round mental development; but some—as, for example, the thin-nosed variety—succumbed to the temptation to use their hands as feet, and so lost their mental superiority, the baboons actually becoming four-footed again. But many resisted these temptations, and applied themselves with all diligence and singleness of heart to walk uprightly. These went on developing their minds in a thoroughly consistent manner. The fossilized remains of one such pre-human member of the human stock has been found in Oligocene strata in the Egyptian Fayum, representing apparently the forerunner of the gibbons. In the next epochs, the Miocene and the Pliocene, the anthropoids became definitely specialized, and thus lost their original pre-human form. This is seen in the fossil remains of an extinct ape named *Palæopithecus*, recovered from a deposit in the Siwalik hills, near the Himalayas in India, thought to have been formed in the Pliocene period. The animal was closely related to the chimpanzee, the gibbon, and the gorilla, but the human character of the teeth suggests that it was only in process of departing from the common direct ancestor. The gorilla and the chimpanzee may be taken as examples of apes who gave up all attempts at “higher education,” and went in for muscular development instead. The gibbon, on the contrary, retained the power of walking upright, but it failed to become man because its brain

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had not yet reached a sufficiently high degree of development to enable it to use its hands for skilled work. This shows it was not the adoption of the erect attitude that made man, otherwise the gibbons would have reached the goal in the Oligocene. Rather was it the gradual perfecting of the brain in conjunction with the other factors which built up the requisite mental structure.

While the anthropoids were busy settling their own fate, our ancestors were engaged in all-round development, and consequently began to make rapid strides towards the attainment of human intelligence. All kinds of new impressions were penetrating the slowly enlarging brain, where they became stored up and associated with sounds and sights. In short, general ideas were being formed which found expression in rational conduct. As recently as 1924 a fossil skull was discovered at Taungs, Bechuanaland, in a deposit of early Pliocene or Miocene antiquity, which may possibly belong to this interesting stage of evolution at the dawn of human intelligence. The remains appear to represent a definitely non-human creature, but more intelligent than a gorilla or chimpanzee. He was unable to talk, but his brain seems to have been developing in a manner that would ultimately have led to his acquiring the power of speech. Unfortunately, however, he was only about four years of age, and therefore we cannot be certain how the adult would have developed. Nevertheless, we shall probably not be far wrong in regarding him as a man-like ape rather than an ape-like man.

PITHECANTHROPUS.—Another example of an unusual product of evolution is the famous *Pithecanthropus erectus*, or "ape-man," who stood erect, found in Java years ago (Fig. I.). In early times this island, like its neighbours Sumatra and Borneo, was joined on to the continent of Asia, and in Sumatra and Borneo survive varieties of the orang, the second cousin to the chimpanzee and gorilla of Africa. Realizing that Java was a very likely place in which to find the remains of the humanoid family,



FIG. I.—A RECONSTRUCTION OF PITHECANTHROPUS.
(After a model by J. H. McGregor.)

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Dr. Eugene Dubois, a surgeon in the Dutch army, commenced digging operations on the eastern bank of the Solo River near a native village named Trinil. Here, in 1891, he unearthed the roof of an extraordinary skull, two molar teeth, and a massive thighbone. On examining his finds he discovered that the remains, although fragmentary, had many peculiar features which in his opinion pointed to their belonging to a "missing link." He then proceeded to a very thorough investigation of the stratum in which they occurred, and in the next three years he removed from this layer fossil bones representing twenty-seven different kinds of mammals, most of them belonging to species which are now extinct. After comparing the animal remains with those found in similar deposits in India, he came to the conclusion that they, together with *Pithecanthropus*, were embedded at the end of the Pliocene period, and had remained in undisturbed seclusion in their final resting-place till he came upon them in 1891.

This attractive explanation of the discovery, however, is not accepted by all experts, and various interpretations of the strange fossil have been given in the long and heated controversy that has raged round these contentious bones. Some have regarded them as the remains of a large gibbon, others as those of a pre-human ape-man, or a primitive man who went off at a tangent. Furthermore, the precise date of the deposit in which the mysterious creature occurred is equally uncertain. The associated animals might have lived equally well in the Pliocene as in the early Pleistocene, or *vice versa*, and there were no implements or other objects in the section to throw additional light upon the problem. The gravel is also indefinite in character. The actual remains consist of a very ape-like brain case with a poorly developed pre-frontal region, and a cranial capacity estimated at 850 cubic centimetres. The size of a man's head, of course, is no precise criterion of his intellectual powers, but, nevertheless, a brain must reach a certain weight—950 grammes or 1,000 c.c. in volume—

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before it can become the seat of human intelligence. Pithecanthropus, therefore, is well below the human level. At the same time it must be remembered that Professor Elliot Smith thinks that the part of the brain controlling the power of speech was sufficiently developed to enable him to talk in very simple utterances. Again, the thigh-bone has a human form suggesting an upright posture, and is less ape-like than that of cave-man living at a much later period. The teeth also were human in type. As Sir Arthur Keith has said, "in stature, shape and weight of body, Pithecanthropus was human," human, in fact, in all his parts save his brain, and even here there are important points of divergence from that of the ape. Nevertheless, if it was mental capacity that constituted man and differentiated him from the rest of the mammalian stock, Pithecanthropus is perhaps best understood as man-in-the-making, a "might-have-been," rather than a missing-link.

PILTDOWN MAN (EOANTHROPUS).—About the time that Pithecanthropus was living in Java, or perhaps rather later, a very different type of individual might have been seen in Sussex, in the picturesque valley in the gap in the South Downs, between Lewes and Uckfield, where the Ouse makes its way from the Weald to empty itself in the Channel at Newhaven. If we may draw a general conclusion from a single example, and that of a fragmentary nature, it would seem that in a very remote period, possibly half a million years ago, a definitely human being had reached our land, who "saw, heard, felt, thought, and dreamt much as we do still." For the portions of the remarkable skull which were found by Mr. Dawson, a lawyer of Lewes, in 1911 and 1912, in a narrow stratum of gravel on Piltdown Common, are very similar to the same parts of a modern skull, except as regards their thickness and the shape of the jaw and the lower part of the face (Fig. II). The cranial capacity is still a matter of dispute, the estimates varying between 1,200 and 1,400 c.c., but it is absolutely agreed that the brain comes definitely within the

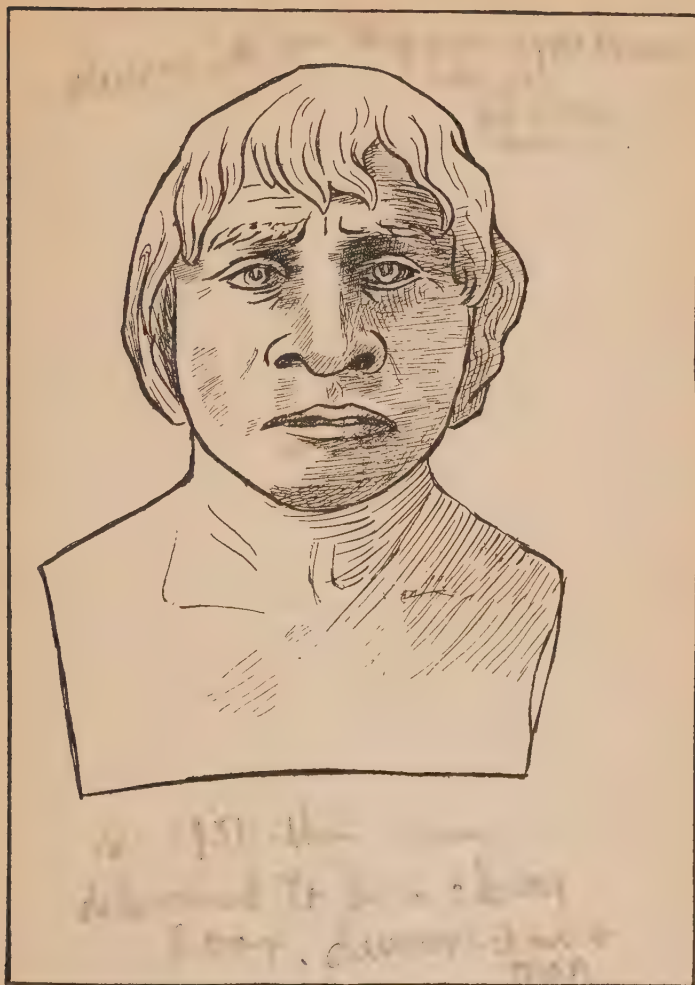


FIG. II.—A RECONSTRUCTION OF EOANTHROPUS (PILTDOWN MAN).

(After a model by J. H. McGregor.)

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human range of variation. If, as Sir Arthur Keith and Sir A. Smith Woodward think, the remains are those of a woman (a view that is rejected by Elliot Smith), then the head of the ancient lady of Piltdown was about the same size as that of the average modern English-woman; and if the larger estimate—that of Keith—be accepted, her brain capacity was considerably above that of the seventeenth-century female skulls found in the Whitechapel plague pits, which measured on an average 1,300 c.c. But even the lower measurement (1,200 c.c.) brings it within the range of primitive people such as the aborigines of Australia.

The lower jaw, on the other hand, is more like that of a young chimpanzee than of a man, but here, again, the teeth though large are definitely human. It has been surmised by some experts that the jaw really belonged to an ape and not to the Piltdown skull; but this view is now seldom advocated, and Professor Elliot Smith has shown how the evolution of the human brain involved changes in the upper part of the head while the jaws retained much of the uncouthness of man's simian ancestors.

The fitting together of a skull from a few fragments is beset with difficulties, and while amazing results have been achieved, it is inevitable that reconstructions do not always agree in shape and size, since the smallest discrepancy may have far-reaching effects on the cast. It is therefore not surprising that the latest reconstruction of this skull by Professor Elliot Smith, Dr. Beattie, and the late Dr. J. I. Hunter differs in several important features from that of Sir Arthur Keith, just as this in its turn departed from its predecessor constructed by Sir A. Smith Woodward. So far from the archæologist "making one mistake and sticking to it," as has been alleged by an unfriendly critic, actually he is continually revising and perfecting his experiments, as "the marvellous and triumphant aeroplane is made out of a hundred mistakes." To test the accuracy of skull reconstruction from small original fragments, an in-

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genious device was tried a little while ago with wonderful success. A modern skull was taken and casts made of it. It was then broken to pieces and fragments corresponding to those found at Piltdown were given to an expert to reconstruct. The result proved a great triumph for the restorer, and though it may be objected by the hypercritical that an anatomist would be influenced subconsciously by his familiarity with the proportions of a modern skull, yet experiments of this kind have proved the accuracy and skill now achieved in this department of research. A further illustration is afforded by the fact that when one of the teeth of the Piltdown skull was found after the original reconstruction had been made, it fitted exactly into the socket prepared for it!

At present prehistoric archæology is rather like a jig-saw puzzle, and although the general outline is now clear, until the missing pieces are discovered the complete picture cannot be reproduced. In such a gigantic scheme, that some of the pieces do not always fit is not surprising. The really remarkable thing is the amazing skill with which the existing fragments have been put into their right places, and, generally speaking, how very well the new pieces fit when they are discovered. It is, of course, easy to poke fun at men who are laboriously collecting their material and putting it together in such a way that sure foundations may be laid to the great human edifice they are reconstructing. But prophets and wise men make merry at the end and not at the beginning of an undertaking. At present we are only in the experimental stage, and it ill becomes either the spade-workers to speak with the assurance of craftsmen who have completed their task, or the bystanders to jeer as they look on and gather up such fragments as they are able from the picks and shovels of the labourers.

Bearing these considerations in mind, let us betake ourselves in a humble spirit to the scene of the great discovery on Piltdown Common, equipped for a tour of

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the Weald occupying several days. Pushing open the white gate at the entrance to Barkham Manor, just off the Common, we find ourselves in an avenue leading up to a farm-house. Even to the experienced eye of the "field-worker" (as the practical archæologist is sometimes called) a less likely spot for an epoch-making discovery could hardly be imagined. Proceeding on our way undaunted by adverse appearances, we at length discern near the house a narrow cutting about 4 feet deep on the right-hand side between the road and the hedge. Unbelievable as it may seem at first sight, it was in this little stratum of deep yellow gravel resting on a bed of yellow clay and sand covering the ancient wealden rocks (the Hastings bed, to give it its geological name) that Mr. Dawson found the human bones described above, with ancient animal remains, including the teeth of the hippopotamus, the primitive horse, the Mastodon and Stegodon, a piece of the antler of the deer, and a very extraordinary tool 16 inches long, 4 inches wide, 2 inches thick at its pointed end, made of the thigh-bone of a gigantic prehistoric elephant (*Elephas meridionalis* or possibly *Elephas antiquus*) that lived in the Pliocene and became extinct early in the Pleistocene. Moreover, other tools were discovered in the strata, representing flints similar in type to those known elsewhere to have been the work of early man.

EOLITHS.—For many years the particular kind of gravel which occurs in this deposit has been under observation by archæologists, for it has been contended that in it is to be found the earliest work of men's hands. The passage of the fore-limb into the hand, as we have seen, played a prominent part in the evolution of the human mind, and it was probably also responsible for the beginning of human culture. Just as monkeys today may be seen at the top of trees throwing down coconuts on the heads of the unwary, so doubtless in early times man used stones as missiles in hunting his prey, and for any other purpose for which they were

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suitable. But very soon he seems to have discovered that flint or stone could be chipped to the shape required by knocking off pieces with another stone. Thus began the Stone Age. But the flaking of flint is an *art* as well as a science, and the first attempts at tool-making must have been very different from the finished products of later ages. The earliest implements, therefore, may well have been merely stones shaped by natural forces into a more or less convenient form, and then adapted to the requirements of the moment by a few additional artificial chips. But however useful such articles may have been to the user, they are a great problem to the archæologist, for who is to say whether a stone of this character is the work of nature or of man? Hence has arisen a lively controversy, which has raged persistently since 1867, when the Abbé Bourgeois first produced these so-called "Eoliths," or "dawn stones," from Upper Oligocene beds and claimed for them human origin. In the years that have intervened the evidence has been carefully reviewed, and numerous experiments in flint flaking by natural and artificial means have been carried out, with the result that while expert opinion is still divided, it is becoming recognized that the Stone Age began with a pre-palæolithic industry, which may go back to the Tertiary era.

The typical eolith (Fig. III.) is a roughly chipped piece of gravel which can generally be detected by its deep yellow staining and much-worn condition. Patches of this Plateau gravel are found in various places in England, but nowhere has the problem of eoliths been more persistently studied than on the highest parts of the North Downs. Here the familiar figure of the veteran collector, Benjamin Harrison, might be seen, until his lamented death in 1921 at the age of eighty-three, day after day mounting the steep and wooded ascent to his hunting grounds, nearly 500 feet up, when an hour could be spared from his grocery business in the charming Kentish village of Ightham. The old-fashioned shop situated at the fork of the roads

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leading from the bottom of the village to the wealden heights seemed to contain more eoliths than sugar and



FIG. III.—EOLITHS FROM PITS ON KENT PLATEAU.

raisins, and he was a strong-minded man who left the congenial hospitality of Mr. Harrison without feeling

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that after all there is something to be said for the humanity of these regularly shaped stones. Thus in the eighties he succeeded in convincing Sir Joseph Prestwich, although Sir John Evans proved to be less open to conviction; and since then Prestwich and others have tried to work out the problem in a thoroughly scientific way.

Today Kent and Sussex consist of a series of hills and valleys with the Weald as a large green cup, on the north side of which lies Ightham and the North Downs, while thirty miles to the south is Lewes and the South Downs. Formerly, however, this cup was a great dome of chalk, perhaps 2,500 feet high at the crown, and Prestwich thinks that the red gravels containing the eoliths must have come down the north slope of the dome whilst the latter was still intact. If this was so, the North Downs have been the home of man for hundreds of thousands of years. It is these same deep yellow gravels that recur in the stratum at Piltdown, near the southern lip of the wealden cup. It was, in fact, their presence as road metal that first attracted the attention of Mr. Dawson, and led him to follow up the clue. For twenty years he had been searching the strata of the Weald on the Sussex side, and when one day, "while he was walking along a farm road close to Piltdown Common, he noticed that the road had been mended with some peculiar brown flints, not usual in the district," his interest was aroused, and he determined to discover their source. On inquiry he found to his astonishment that they were dug from a gravel bed on the farm, notwithstanding that this was four miles north of the limit where the occurrence of flints overlying the wealden strata had been recorded. The workmen at that time had not noticed any bones or fossils in the deposit, but on a subsequent visit one of the men handed to Mr. Dawson a small piece of bone which proved to be a portion of the roof of the Piltdown skull! Since then the deposit has been subjected to a systematic search, and by dint of much labour its secret has

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gradually been revealed, though even now the mystery is not quite cleared up.

PILTDOWN STRATA.—The deposit is composed of stratified gravel laid down by running water, and divisible into five sections.

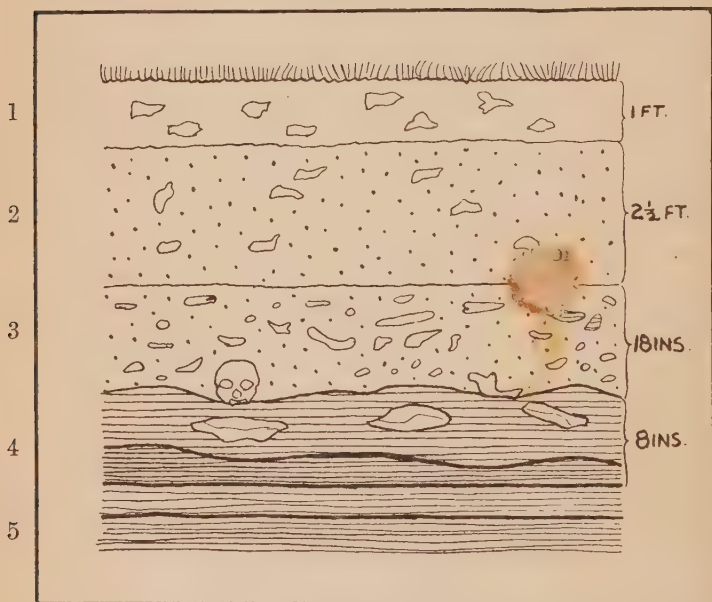


FIG. IIIA.—SECTION OF GRAVEL BED AT PILTDOWN, IN WHICH THE REMAINS OF THE SKULL WERE FOUND.

1. Surface-soil with flint implements of various ages and pottery.
2. Pale-yellow sandy loam with patches of dark ironstone-gravel and palæoliths.
3. Deep-yellow ferruginous gravel containing remains of *Eoanthropus*, eoliths and Mastodon teeth.
4. Yellow clay and sand solidified covering wealden strata.
5. Ancient wealden strata (Hastings bed).

Above the ancient wealden strata was a bed of yellow clay and sand, and on this rested the deep yellow ferruginous gravel (associated elsewhere with eoliths) con-

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taining the piece of the jaw and a small part of the skull. There is every reason to think that the other fragments found by the men came from this layer, together with the bone implement, the Mastodon and Stegodon teeth, and some rudely shaped and water-worn flints corresponding to the eoliths of the Plateau gravels at Ightham. In the stratum above, composed of pale yellow sandy loam with small patches of dark ironstone gravel, a higher type of flaked flint implement occurred, which was described by Dawson as belonging to that stage of Palæolithic culture known as "Chellean," after the place *Chelles* on the Marne near Paris, where this industry was first studied.

CHELLEAN IMPLEMENTS.—Chellean flint tools, which represent the first main division of the Old Stone Age or Palæolithic period, are usually pear-shaped, heavy axes made by simply flaking a large piece of flint (the core), without any attempt at trimming the edges. Sometimes they may have been hafted by being bound to the end of a stick by a thong, and this may account for their being so often blunt and covered with the natural crust of the flint at the butt-end. It is thought, however, that they were also held in the hand, and therefore they are generally called by the French term *coup-de-poing*. Sollas has renamed them "bouchers," in honour of the great Frenchman, Boucher de Perthes, who first studied flint implements in the gravels of the Somme. Nevertheless, *coup-de-poing* still holds the field. Some typical implements of this stage are illustrated in Fig. IV. Awls and oval scrapers were used probably for boring holes and cleaning skins, and cutting up meat, wood, and hide.

PRE-CHELLEAN IMPLEMENTS.—Further examination of the flints in the upper stratum at Piltdown has certainly not confirmed Dawson's original estimation of them as belonging to this Chellean stage of culture. Thus Mr. Reid Moir, who with Benjamin Harrison has done more than anyone to elucidate the problem of man's handicraft at the dawn of the Stone Age, places

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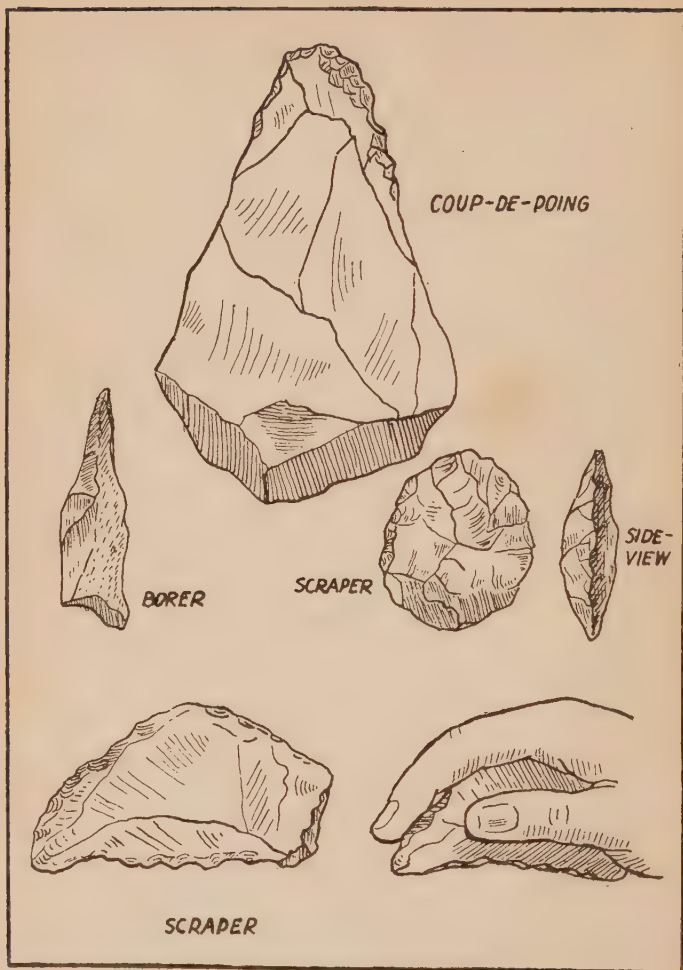


FIG. IV.—CHELLEAN IMPLEMENTS.

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them in a period preceding the *Chelles* phase, having himself found flints very similar in deposits which considerably pre-date those containing the Chellean types. There is no doubt that a very long period intervened between the time when "eolithic" implements (whatever they may have been) and the later tools like those in question at Piltdown were made. Mr. Reid Moir has collected specimens of pre-palæolithic tools at Foxhall, near Ipswich, in a Pliocene deposit known as Red Crag, composed of pebbly gravel, sand, and clay. This "Crag" deposit of marine sand, which is peculiar to our eastern counties, was laid down at the end of the Pliocene in the tertiary era in comparatively shallow sea-water, when large tracts of land were submerged owing to earth movement. Above it lies the deposit left by the ice of the subsequent glacial periods—*e.g.*, the Cromer beds containing blocks brought from the north by the ice, and the chalky boulder-clay made up of fragments of great boulders ground off by the passage of glaciers. As the land surface became slowly submerged beneath the Crag sea, any objects lying upon it would doubtless have been swept into hollows in the surface clay and covered by the sand shells of the Red Crag sea. Now Mr. Reid Moir has found flints *in situ* in three levels of the Red Crag in Suffolk and in the clay bed at its base. It is very difficult to believe that these flints were formed by natural agencies, especially as some of them belong to a distinct type described by Sir Ray Lankester as *rostro-carinate*, because they are shaped like the beak of an eagle (Fig. V.). A number of experiments have been carried out to determine how such implements could have developed from simple scrapers by flaking on both sides to form a keel (*cf.* Fig. V., dorsal or upper surface) which is strongly curved (*cf.* Fig. V., left lateral surface), giving the implement the form of the beak of a bird or of the prow of a boat turned keel upwards. An upper or dorsal plane and a lower or ventral plane can be distinguished, together with a right and left lateral or

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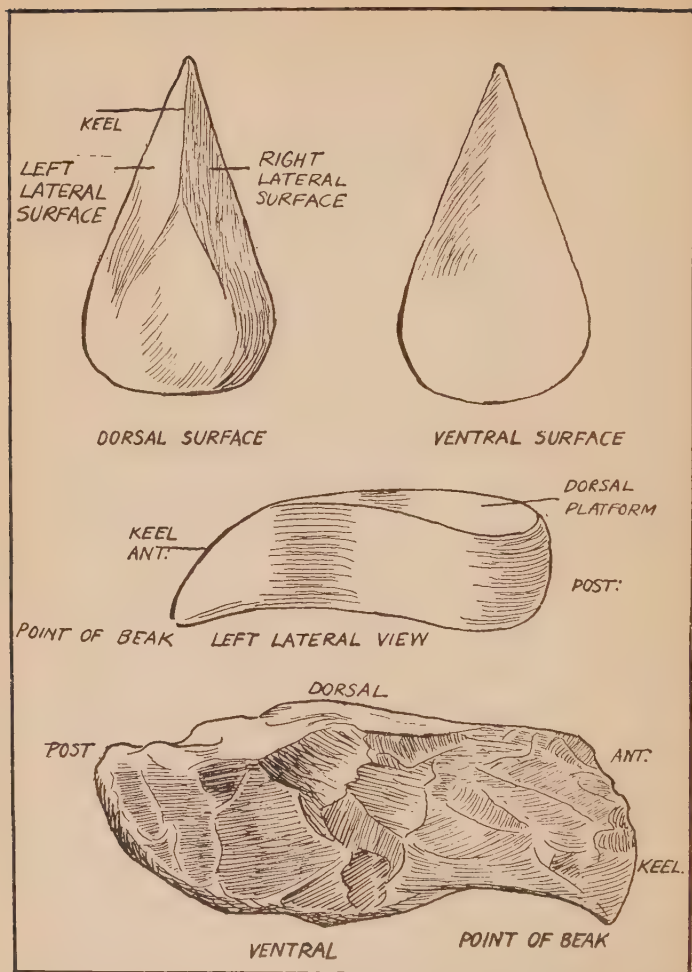


FIG. V.—THE CONSTRUCTION OF A ROSTRO-CARINATE IMPLEMENT.
 (After Sir E. Ray Lankester, from *Philosophical Transactions of Royal Society*, vol. ccii. B.)

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side surface, and a posterior surface or stern, usually roughly flaked as though for holding in the hand. Evidently the anterior surface, narrowed in the form of a keel and ending in a beak, was the "business end," but for what purpose such a tool could have been used it is difficult to say. Sir Ray Lankester thinks it was not improbably employed for "dressing and smoothing the skins of animals," but this is merely a guess which may or may not be true.

FLINT FLAKING.—In addition to the rostro-carinate, which is now accepted as a genuine humanly formed implement by many archæologists, scrapers, borers, and choppers have been recovered from below the Crag, suggesting both in form and flaking the hand of man. When a human being trims a flint he invariably strikes it at varying angles and obliquely, although, as Mr. Hazzeldine Warren has shown, nature in using a heavy crushing force on a large scale can and sometimes does make numerous counterfeits of human flaking. Nevertheless, the trained eye can usually detect the tabular form with high angle chipping, patinated, and equipped with "striking platform" and "bulb of percussion" at the end of the flake, characteristic of the artificial artefact. Bulbs of percussion produced when the flake is detached from the core may occur on naturally severed chippings, but in this case there is no flat surface or "striking platform" at the end upon which flake-removing blows can be struck (*cf.* Fig. VI.). Again, flint that has been worked by man frequently changes colour or, as we say, becomes "patinated." First, a sort of "bloom" appears on the surface, and increases in intensity till a white film is formed through which the black flint appears as though covered with a thin blue coating. Some implements have a diversity of patina, together with yellow, red or brown stains.

One of the most profitable excursions that the student of the Stone Age can make is to Brandon in Suffolk, a veritable town of flint—having flint roads, a flint war memorial, and flint houses, in which dwell

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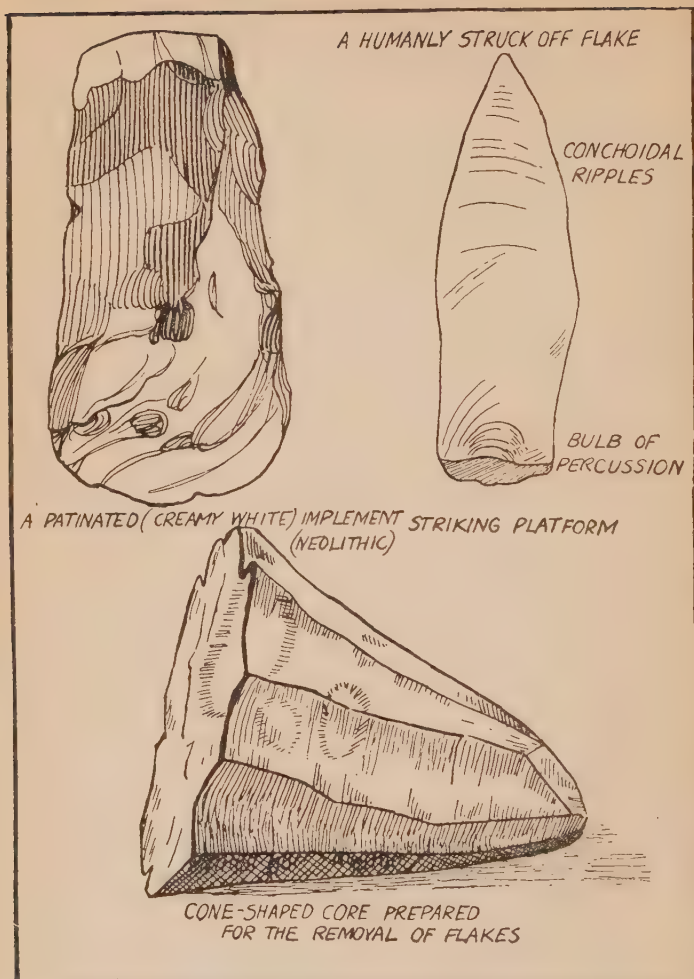


FIG. VI.—HUMAN FLINT FLAKING.

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flint-knappers, who may be seen at work, striking off thousands of gun-flints for flint-locks, still used by the natives in Africa. It has been seriously contended that the modern knappers are lineal descendants of the original Stone Age flint-miners, and it is certainly a curious fact that not only have these people a technical language of their own, but they still employ the same methods of extracting flint from the pits at Lingheath on the edge of the town, using one-sided picks, identical in form with those made of red deer antlers at the ancient mines near by at Grime's Graves. Moreover, the Brandon knappers today could hold their own with the prehistoric craftsmen even at the height of their industry. Not only can they copy with amazing skill even Solutrean blades (*cf.* p. 137), but Mr. Snare boasts of having made a flint ring, to say nothing of fish-hooks. Again, before leaving Brandon, on no account should a trip to the mines at Grime's Graves be missed, for there we have a unique opportunity of studying ancient flint-mining, patination, and the types of an interesting industry to which we shall refer later on in this volume.

In order to understand the works in flint and stone of early man, it is necessary for us to adopt the experimental method, and not content ourselves merely with reading books about the Stone Age. By trying to make implements ourselves we learn both how flint fractures under the human hand, and we begin to realize the wonderful skill achieved by our Palæolithic ancestors. Then when we go out into a ploughed field—or better still visit a gravel-pit or cutting where ancient deposits occur—our eyes soon become accustomed to the “look” of the genuine artefact. The prehistoric archaeologist, however, is not a mere collector, but a scientist, a discoverer and investigator of facts. His object in excavating or examining a site is to determine the relation of the things in the section to the successive periods revealed by its stratification. In this way men like Reid Moir, Dawson, and Harrison have been enabled to throw so much light on the problem of early

man, while at the same time being engaged in other occupations. Thus, when Mr. Reid Moir inspected the implements alleged to be of Chellean type found in the stratum at Piltdown, as a practical flaker of flint he was able to recognize that they were not "palæoliths" (i.e., Chellean), as was supposed, because they had ill-defined cones of percussion and rough, heavily truncated scars,¹ technical features which stamp them, in his opinion, as the work of pre-palæolithic man. Moreover, he has found similar specimens below the Pliocene Red Crag in East Anglia, and therefore he concludes that "the remains must have existed at a period the remoteness of which is much greater than that of the Palæolithic epoch." As the bones show no signs of having been worn by water, unlike the eoliths and the remains of the mastodon, and *Elephas meridionalis*, they would seem to be connected with the unworn implements in the upper layer and the later animals; but if Reid Moir's conclusions are correct, man, nevertheless, existed in Pliocene times before the ice made its appearance in Sussex. The actual skull suggests an early type of humanity, and if even he does not altogether merit the name *Eoanthropus*, the "Dawn Man," given to him by scientists, he (or she) at least can claim to be the oldest member of the human family known at present.

Exactly when or where man arose we cannot be certain at present, but we can give a shrewd guess that it was either in Mongolia or Africa that the human brain emerged in the manner described above, and probably at the end of the Tertiary era. Through overspecialization in one direction or another, many tentative men, of which *Pithecanthropus* may be an example, failed to reach the complete human standard. These less successful representatives of the main stem tended to die out, while the more resolute descendants of the

¹ In the removal of large flakes from a nodule of flint, the resulting scars get reduced in size or truncated in the further process of flaking.

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humanoid stock survived and continued to spread over the earth, of whom *Eoanthropus*, the most ancient Englishman, is apparently a lonely example.

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CHAPTER II

THE COMING OF THE ICE

WHILE the momentous events described in the last chapter were taking place, a change of climate in Northern and Central Europe (including the British Isles) was gradually becoming apparent. The winters grew longer and harder and the summers colder, so that some of the warmth-loving animals and plants began to disappear. As the ice and the glaciers increased inch by inch at the end of the temperate Pliocene period, and penetrated farther and farther south, with the cold northerly winds came the Arctic animals—the woolly rhinoceros and the woolly mammoth, the musk ox and the reindeer—and the scene was set for the first great act in the drama of human history, the events described in the last chapter being better regarded as the prologue.

THE ICE AGES.—This was not the first time that the earth had been subjected to a glacial visitation, for there is evidence of a similar occurrence at the beginning of the Primary era, perhaps eight or nine hundred million years ago, another at or just before the commencement of the Cambrian, and a third in the upper part of the Carboniferous system. The latest or Pleistocene (*i.e.*, Quaternary) Ice Age is naturally the one of which we know most, since the earth is only now recovering from its effects. Indeed, many geologists believe that we are actually living in one of the warmer intermittent phases that characterize a Glacial period, since there is evidence to show that within historical times the earth has passed through changes of climate recalling an interglacial interlude rather than a normal state of affairs. Thus, less than 5,000 years ago, Mediterranean vegetation flourished in Spitzbergen, and the Arctic Sea apparently was thirteen degrees higher in temperature

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than it is now. Greenland then was an agricultural country, Scandinavia had warm summers and mild winters, and alpine passes were not difficult to cross. This continued till about 900 B.C., when the cold spell began, with disastrous results to the Greenland farmers.

The normal climate of the earth has been so warm that outside the Glacial epochs no ice has existed permanently on any part of the land or waters. Therefore the perennial frost that still surrounds the Poles and the Arctic and Antarctic Seas is not only the remains of the last or Pleistocene Ice Age, but also an uncomfortable reminder that we are not out of the ice yet. Exactly how these periodic glacial visitations occur it is difficult to say. Many think that they are due to the earth's slightly shifting its axis of rotation from time to time, but Mr. Brooks, in his latest book, *Climate through the Ages*, after examining all the possible factors, comes to the conclusion that geographical circumstances were the determining causes. In the long periods of normal temperature the general surface of the land was low and the relative area of the oceans was much greater, so that the ocean currents circulated freely from the Equator to the poles. Periodically, however, great disturbances took place giving rise to violent volcanic action, and producing mountain ranges which shut off the polar regions from the warm equatorial currents. Volcanic dust which filled the air acted as a screen from the rays of the sun, and as the snow-fields increased they reflected instead of absorbed the rays. Thus the temperature fell lower and lower, and glacial conditions prevailed till the ice itself began to rub down the land, and violent storms reduced the elevation. This is the latest theory, and we must leave the geologists to pass judgment upon it.

GLACIATION.—A very important agent of erosion and transport is found in moving ice, as anyone can observe who has visited lofty mountain ranges like the Alps. In such regions the snow which falls in winter is too great in amount to be all cleared away by the sun's heat

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in the summer, and so some of it remains unmelted all the year round, and goes on accumulating year after year, forming what is called a snow-field, or *névé*. The snow piled up above the snow-line must be drained off somehow, and as it does not all melt it escapes in a solid mass. The snow at the bottom of the snow-fields becomes gradually converted into ice, partly by pressure of the overlying snow, and partly by the trickling down and freezing of water which has been melted by the sun at the surface. From the edge of the snow-masses long tongues of ice are pushed forward into the valleys. These slowly moving rivers of clear blue ice are called *glaciers*.

On their passage down the mountain valleys—the rate of movement in alpine glaciers being about one foot a day—they collect other masses of snow solidifying into granular blue ice, and so great is the weight and pressure that the rocks in their path are broken up and the sides of the valleys worn smooth. Of course, splintered rocks or any objects falling on the ice are carried with it, till at length, when the glacier reaches a warmer region, it melts away, and the stones are shot down into great heaps called *terminal moraines*, while the water flows away as a river. The moraines consist of a mass of mud and clay mixed with sharp stones, some of which may have travelled many miles without receiving any signs of wear and tear, and a certain proportion of polished, scratched and grooved stones, borne under the glacier and worn down there. Much of the finer material, however, is washed away by the river, and in this way carried many miles from its mountain home. If the temperature of the plains is not sufficient to melt the ice, the glacier increases in size as it advances further from the mountains, and a new terminal moraine is formed.

“DRIFTS.”—Wherever glaciers have existed, then, rocks are found polished by the ice, and scratched by the stones embedded in them, together with unstratified gritty clay laden with rock *débris* of various kinds, the

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boulder clay or *till* (*cf.* p. 47), and outwash or rubble beds, with a profusion of lakes. These glacial deposits are known as "drifts," a term which includes the gravels and sands and other formations of the Pleistocene ice sheets. Before the Glacial period there must have been a great thickness of weathered rock overlying the unchanged formations beneath, such as may now be seen in districts unaffected by glaciations; but where the ice prevailed this has generally been swept off, and the surface polished and rounded and pared down into solid rock. Thus the Alps today are lower than they were in the Pliocene epoch, because in the meantime they have been subjected to glaciation, the ever-increasing snow-caps giving rise to more and more ice-rivers flowing inch by inch into the valleys till the whole of the surrounding region was a thick mass of ice. The original surface of the mountains was grounded off and deposited along the courses of the ice-streams.

RIVER TERRACE GRAVELS.—Every traveller in Switzerland is familiar with the mountain torrents rushing down the sides of the mountains in summer from the melting glaciers above. In winter the streams lose their force as the volume of water diminishes, and the material supplied to it by frost and other disintegrating agencies in the high ground, and from the terminal moraine, is laid down as sheets of gravel. When a thaw sets in the water again flows with increasing rapidity, and new channels are cut. The bed of the river is deepened by the rapidly flowing water and the previously deposited gravel is removed. Little patches of it are left, however, here and there along the sides of the valley, which remain as gravel terraces high up above its banks. Occasionally two or three of these terraces may be found one above the other. With every subsequent freezing up and outpouring of the glacial stream this operation is repeated, carrying the terraces farther and farther and farther along its course. In this way the river terrace gravels were formed in the Pleistocene period, and therefore they afford a valuable indication

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of the series of changes in temperature that occurred during the Quaternary Ice Age.

When the prolonged wintry conditions prevailed first in Northern Europe, the volume of water in the rivers could not have been very great, as so much was absorbed by the ice of the glaciers, but with the first general thaw, or *interglacial phase*, and the flooding of the streams that followed, the process of erosion and denudation began. But with the return of the frosts during the Second Glacial Period the rivers again fell, and instead of deepening their bed they built up a gravel deposit, till at the next (second) interglacial episode the beds were cut down to a new level, leaving a terrace of gravel above their banks.

GLACIAL PHASES.—This connection between the glaciers and their deposits has enabled geologists to work out the successive phases of the Ice Age, and it is now generally thought that the snow-line was lowered, and the valley glaciers were greatly enlarged four times, with three interglacial phases between. Professor Penck has given the name *Günz* to the First Glacial Epoch because in the region of the Alpine Günz River he succeeded in connecting the older outwash with its moraine. This was at the beginning of the Ice Age. Then followed a younger outwash in the district of the Mindel River, and so to the next glaciation he gave the name *Mindel*.¹ The Third Glacial Epoch he called *Riss*, after the upper terrace outwash of the Riss valley in the Rhine glacier. Finally, fresh lower-terrace outwash and younger moraines in the Würm valley revealed a fourth glaciation known as the *Würm* period, at the end of the Pleistocene. Since the moraines of the Riss period extend beyond those of the Würm, it is concluded that the frost was spending its force in the last glaciation. After this warmer conditions prevailed during the *Achen* retreat, till the glaciers returned

¹ M. Boule, of Paris, regards the Günz and the Mindel as parts of the same glaciation, and thus differs from Penck and Brückner by dividing the period into three instead of four divisions.

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temporarily at the *Bühl* advance, before the present mean annual level of temperature was reached. The interglacial episodes which alternated with these glacial epochs are generally described by the terms *Günz-Mindel*, *Mindel-Riss*, and *Riss-Würm*.

CHRONOLOGY.—To estimate the duration of these events in terms of years can only be in the nature of a guess so slow were the variations in climate, but, according to Penck, the Günz may have lasted for half a million years, the Mindel for 400,000 years, the Riss for 150,000, and the Würm for 50,000, while some think it was perhaps 35,000 years ago that the ice began to retreat for the last time; but this estimate is probably very much too high, 10,000 to 5,000 B.C. being nearer the mark, perhaps, for the final disappearance of the glaciers. For the Riss-Würm interglacial phase Penck gives 60,000 years, and 250,000 for the Mindel-Riss. Thus on this estimate the whole of the Ice Age occupied nearly a million years, and to this Pilgrim adds 290,000 years. Hildebrandt, on the other hand, is content with half a million years, and Obermaier thinks that 300,000 years suffice for the reign of the ice. Sollas, working on the supposition that the deposits were laid down during the Pleistocene at the rate of a foot per century, and that they represent a depth of 4,000 feet, arrives at 400,000 years for the total length of the period. Although the prehistoric archæologist is prepared to grant a very long life for man on the earth, the date for the last extreme glaciation, which he is able to calculate with something approaching accuracy, in no way coincides with the longer estimates of the geologists. It is becoming agreed that evidence from human sources greatly reduces the date for the close of the Old Stone Age, 6000 B.C. being in round numbers a very probable time for the final retreat of the ice. Rutot, in fact, reduces the whole of the Pleistocene to a duration of 140,000 years, and the following table, put forth by Professor Keith in his latest edition of *The Antiquity of Man* (1925, vol. ii., p. 717), gives an estimate of the length of the Old Stone

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Age suggested by the human cultures. With this may be compared an alternative fourfold division of the Pleistocene into *Sicilian*, *Milazzian*, *Tyrrhenian*, and *Monasterian*, devised by Professor Dépéret, and based on river terraces and shore-lines in the Mediterranean. A detailed description of this scheme will be found in the latest edition of Sollas's *Ancient Hunters* (1924).

After Keith.

After Dépéret.

	PRESENT		RECENT
	NEOLITHIC		
20000 B.C.	AURIGNACIAN		UPPER MONASTERIAN
40000 B.C.	MOUSTERIAN	Würm glaciation	Neanderthal LOWER MONASTERIAN
	ACHEULEAN		UPPER MONASTERIAN
80000 B.C.	CHELLEAN		LOWER TYRRHENIAN
120000 B.C.	EARLY CHELLEAN	Mindel glaciation	Pitldown
200000 B.C.	PRE-CHELLEAN	Günz glaciation	UPPER MILAZZIAN
300000 B.C.	SUB-CRAG		LOWER MILAZZIAN
350000 B.C.	KENTISH EOLITHS		UPPER SICILIAN
			LOWER SICILIAN (Pithecanthropus)

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In view of the nature of the evidence and the wide divergence among experts, it is perhaps better at present to think in terms of generations or "periods," rather than in years, in dealing with the more remote stages of the Stone Age, for it is only when we reach the Upper Palæolithic that numbers represent measurable periods of years. Nevertheless, since dates are normally calculated in figures, even the rough estimates help to convey to our minds the sort of time that probably elapsed between the various advances and retreats of the ice.

ICE-CENTRES.—Whatever may have been the precise length of the glaciations and their more genial interludes, it is clear that there were localized centres of European glaciation. Thus, in addition to the Alps, the Pyrenees and the Apennines produced important glaciers, while those of the Baltic basin affected the whole of the North, including the British Isles (Fig. VII.). Smaller centres occurred even as far south as Italy and Spain, and during the greatest extent of the ice, in the second or Mindel stage, it covered in all about two million square miles, and probably twice this area in North America. Even today nearly six million square miles of ice-covered ground exists in the Arctic and Antarctic regions, and in Pleistocene times one-fifth of the total land surface of the earth is said to have been under ice.

FOREST BEDS.—In almost every European country where traces of glaciation are found, there are unmistakable indications of very warm spells between the severe "winters," so warm, in fact, that the hippopotamus and the southern elephant made their way to Northern France and England, while in Scotland buried forests in the peat bogs have been discovered implying a genial climate, but overlaid by a deposit of peat containing arctic plants. At Cromer, in Norfolk, the forest bed reveals a succession of marine fossils beginning in the lower deposits laid down in the Pliocene with forms which occur in a warm climate, and passing upwards

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through a series in which northern types increase and southern species diminish, until an arctic fauna is reached in the Günz beds. Overlaying these are the stumps



FIG. VII.—EUROPE DURING THE GLACIAL PERIOD.

of such interglacial trees as the beach, elm and pine, which again are followed by arctic conditions.

THE HÖTTING BRECCIA.—The most instructive example of the changes of climate during the Ice Age, however, comes from the Austrian Tyrol. Anyone

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with a geological turn of mind who visits the charming town of Innsbruck can hardly fail to notice the horizontal band of red stone on the northern snow-capped mountain-chain before him, about 500 feet above the village of Hötting, as he crosses the Inn bridge (whence the town derives its name). On the north side of the Inn valley, to the right of the bridge, is the oldest part of the town—the *Mariahilf* district (so named after a miraculous picture of Our Lady now in the Parish Church), with many old inns and quaint narrow streets, towering one above the other on the steep incline of the mountain-side, and inhabited by a peculiar population, distinguished by its coarse wit and singsong dialect. High above Mariahilf, on the slopes which rise upward to the peaks of the northern mountains, is the large village of Hötting. Here the peculiar red stone, of which so many of the buildings in Innsbruck are constructed, is quarried in the side of the mountains. Upon closer inspection, the horizontal red band is found to be several hundred feet in thickness, and composed of dark grey dolomite limestone bound together with a reddish paste of the débris eroded by a mountain torrent. Below this *breccia*¹ is a dark blue clay upon which can be seen ice scratchings. This is a boulder-clay and represents a moraine formed during the Third, or Riss, Glacial Epoch. Since the *breccia* overlies this, it must be of later date. If we continue our ascent up the mountain-side past the Höttinger ravine and the pilgrim's chapel, whither believing students resort to seek the aid of the Virgin in their examinations, at a height of nearly 3,000 feet, we find a second deposit of boulder-clay representing a moraine formed in the Fourth, or Würm, Glacial Period, resting directly over the *breccia*.

Now this arrangement of the strata suggests that

¹ A rock made of pieces of stone which have been broken from some other rock and cemented together by a paste of fine mud or sand, or some chemical substance such as carbonate of lime, is called by the Italian name *breccia*, "a crumb."

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the horizontal band of red stone, or breccia, belongs to the third interglacial phase, between the Riss and the Würm glaciations, and this conclusion is supported by the numerous fossil remains of alpine plants that have been found in the deposit.¹ Among the forty-two different species which have been identified by Von Wettstein, besides such familiar trees as the fir, maple, yew and mountain ash, there are six forms foreign to the Alps, as, for example, a new species of buckthorn similar to that now growing on the Canary Islands, and the Pontic alpine rose which today grows wild in the Caucasus, 5° south of the latitude of Innsbrück with a temperature 3° C. warmer. These and similar facts have led Penck to conclude that when this deposit was laid down the climate of Hötting was 2° C. warmer than it now is, and consequently the snow-line stood 1,000 feet above its present level. This means that snow was very seldom seen on the Alps in those days, except on the highest peaks, and that the vegetation flourishing on the mountains then was much more rich and varied.

The Hötting breccia, in short, representing the third interglacial phase, reveals a time when the ice had disappeared and the mountains had been denuded of their snow, when also forest growth, thickets of rhododendrons, and a quantity of flowering annuals covered the bare rocks, and adorned the dreary expanses of boulder-clay. The upper boulder-clay of the fourth and last glacial advance witnesses to a final descent of the ice, the snow-line then creeping down to its previous level, 5,000 feet below that of the Riss-Würm inter-

¹ Professor Lepsius has recently tried to show that the *breccia* consists of two deposits, the earlier of which, distinguished by its white tint, only contains the fossil flora, and this, he thinks, belongs to the Pliocene. But even if this is true, which is by no means proven, the iron rust to which the red colour is due would naturally tend to destroy the plants embedded in this part of the *breccia*. Moreover, Von Wettstein declares that he found several red and white layers lying one above the other. Lepsius' criticism, therefore, is not exactly a valid objection to Penck's conclusions.

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glacial interval, glaciers replacing the forests of the Inn. As one stands in the Mariatheresien Strasse, the chief thoroughfare of Innsbruck, justly famed as one of the most picturesque highways in Europe, looking northwards to the Solstein mountain-chain crowned with lofty peaks over 6,000 feet high, often covered with snow even in summer, or turning southwards towards the nobly shaped *Serles* pyramid, the rocky altar of the Tyrol, one does not regret that the present interglacial epoch has not removed all traces of the preceding glaciation as completely as in the Riss-Würm interlude.

THE LOESS.—It would be a mistake to suppose that the total annual amount of heat on the earth was less during the glacial periods than the interglacial episodes. What actually happened was that the distribution of heat and cold was different. The warmth in a glaciation was concentrated in short hot summers which were not of sufficient length to melt the ice that had accumulated during the long winter. As the air became drier, and for the most part colder, the forests gave place to grassy plains such as may be seen in Russia and other districts where a similar climate still prevails. These steppes, or plateaux, are not seriously affected by short hot summers and long cold winters, though, judging from the great quantities of bones found in the "sub-aerial" dust deposited on the surface by the wind, the blizzards, and dust storms which accompanied the disappearance of the ice, there was a wholesale destruction of animal life. The ice cooled the air above it, and so produced an anticyclone which continued over Europe as long as the ice lasted, and this anticyclone became the centre whence blew strong winds in all directions. Thus a glaciated district was surrounded by a broad fringe of the dust blown from the caked mud of the glacial streams.

This yellowish-brown or grey sandy and chalky deposit, called *loess*, which covers some of the river gravels on the top of hills and in valleys, was laid down by these wind-storms during the cold dry seasons at the

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beginning and end of a glaciation. The loess lands are very extensive in Europe, stretching from the Ural Mountains across South Russia to the Carpathians and the Danube. They recur in North-West Austria, and continue through the Bavarian plain into Northern France and the South of England, to say nothing of wide tracts of similar country in China and America. Probably a bed of loess was connected with each interglacial phase, but only two (associated with the last glaciation) have survived. Of these, the Older Loess belongs to the pre-Würmian, and the Upper or Younger Loess is post-Würmian.

STRÉPYAN CULTURE.—This is briefly the story of the Pleistocene Ice Age in Europe, and it has been necessary to devote some space even in a small book to these details, because it represents the scenery of the first act of the great Stone Age drama. If man lived in the warm Pliocene epoch of the Tertiary era, he must have witnessed the advent of the First (Günz) Glacial Period, with which the Pleistocene began. It was probably during the earlier glaciation that the pre-palæolithic cultures referred to in the last chapter were developed. Thus the very primitive implements found below the Chellean levels at Strépy,¹ and Mesvin in Belgium, roughly flaked and frequently having part of the crust remaining, were made apparently during the second glaciation (Mindel), because this “Strépyan” type of tool has been discovered in river terrace gravels that clearly were laid down by the flooded ice-streams after the first thaw (Günz-Mindel). At the approach of the second glaciation, Strépyan man doubtless was living by the side of the diminishing rivers, or, at any rate, he had dropped his tools there when he resorted thither for food and water. With the return of a warmer climate in due course (*i.e.*, at the end of the Mindel), the rivers

¹ It is doubtful if the pre-Chellean industry known as “Strépyan” actually occurred at Strépy, but the term, being in general use for these crude implements, is retained here, and the Mesvinian industry is now generally believed to be contemporary with the Acheulean.

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rose again, driving the inhabitants to the higher terraces, and bringing down more gravel. Thus the implements resting on the surface of the ground were covered up or carried along to be deposited lower down the stream in the next terrace of gravel about to be formed. This explains the occurrence of rough pointed axes, side scrapers and hollow scrapers of Strépyan type in association with the later Chellean forms. As a rule, the lower terraces in a river deposit, being the result of denudation and not of accumulation, are of more recent date than those above, and consequently the earlier implements will be found on the higher terraces, which, of course, are older than those below, made as the river cut its channel downwards.

It was at Abbeville, in the valley of the Somme, a British possession for two hundred years, with memories of Crécy, that Boucher de Perthes first investigated flint implements in the river gravel deposits in the first half of the nineteenth century; and thirty miles up-stream is the scene of the labours of the late Victor Commont, who, before the system of classification for the implements of the Old Stone Age adopted by the French archæologists had been proved, found at St. Acheul a series of undisturbed gravel-beds containing *in situ* human tools in precisely the order that had been suggested for the Palæolithic sequence. These are classic and most instructive sites for the student of Glacial man, and he should make a point of visiting them at the first opportunity, especially as they are easily reached from England. Abbeville and Amiens, of course, are the two principal stopping places for the Nord Paris express from the coast, and the well-known capital of Picardy is a good place to begin an archæological tour.

ST. ACHEÛL.—For the majority of people Amiens is associated with one of the grandest Gothic monuments in Europe and, alas! with the anxieties of 1914 till relief came in August four years later. But for the archæologist the chief interest is centred in the

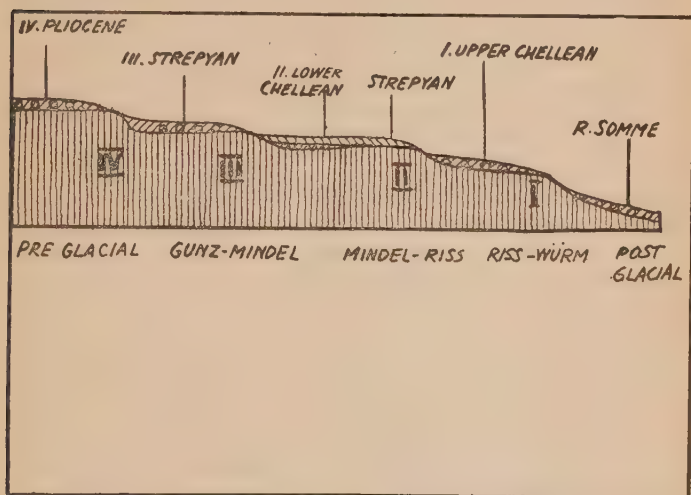
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straggling and uninspiring suburb of St. Acheul, which is reached by a quaint yellow tram, reminiscent of a primitive stage in the development of road transport, that ambles its way through the somnolent cathedral city to the scene of the great triumph of Commont. Alighting near the church, and taking one of the turnings on the left-hand side of the main road, a short walk through very dull streets brings us to the Somme, flowing through a broad valley it has dug in the chalk. In the surrounding gravels, the third terrace contains Strépyan flints, which recur but rarely at the base of the second terrace (Mindel-Riss), probably having been washed down when the new bed was formed in the second interglacial episode. In these gravel sands early Chellean implements have been found, and the remains of the southern elephant, *Elephas antiquus*, indicating that the climate was warm. No fauna has been discovered in the second terrace at St. Acheul, but further down the Somme at Abbeville, at a corresponding level, the third terrace gravels have yielded two species of elephants (*meridionalis* and *antiquus*), the hippopotamus, and three kinds of rhinoceros (*mercki*, *etruscus*, and *leptorhinus*), the sabre-toothed tiger, and several species of deer. Above the three higher terraces there is a loess deposit, belonging to the pre-Würmian, or "Older," division, while covering both the Older loess and lowest terrace is a layer of the Upper or Younger loess.

The absence of any trace of human workmanship, except doubtful eoliths, in the topmost layer or upper Plateau gravel leads us to the conclusion that man did not live on the banks of the Somme before the First (Günz) Glacial Period. The earliest population in this district seems to have been the people who made the rough pre-Chellean Strépyan implements, and lived there in the genial climate of the first (Günz-Mindel) interlude in company with the two great elephants (*meridionalis* and *antiquus*), the hippopotamus, the rhinoceros, the sabre-toothed tiger, the wild boar, and

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the primitive horse. In the next interglacial respite (Mindel-Riss) Chellean man seems to have taken up his abode on the Somme, since his implements occur in the sands overlying the gravels of the second terrace, and, in their later forms, in the gravels of the first terrace (Riss-Würm). Above this is the Older loess (pre-Würmian) in three layers, consisting of sands and



THE TERRACES OF THE SOMME VALLEY.

- IV. Preglacial.
- III. First Interglacial (Günz-Mindel).
- II. Second Interglacial (Mindel-Riss).
- I. Third Interglacial. (Riss-Würm)

(Covering the terraces III. to I. is the Lower and Upper Loess.)

sandy loams, with gravel at the base. Here are found remains of the red deer and *Elephas antiquus*, together with a new type of implement, which derives its name from St. Acheul, just as the earlier Chellean industry is named from Chelles, on the Marne, its type station.

ACHEULEAN IMPLEMENTS.—These *Acheulean* tools are clearly a natural evolution from the Chellean form,

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the hand-axe becoming flatter, smaller, and lighter, with better flaking than in the Chelles period. They are more skilfully made, and the edges more regularly formed in a double curve or **S** twist, the whole being oval or lozenge-shaped (Fig. VIII.). Towards the end of the period, large triangular flakes made their appearance, worked on the rough side only, and doubtless used for scraping the skins of animals and boring holes in them, as well as for cutting purposes. These are called *Levallois* flakes, because they have been found in large numbers at Levallois, a suburb of Paris, in the neighbourhood of Neuilly. A smaller type of triangular axe, with trimming along one side only, has been discovered in a small rock shelter near Les Eyzies, in the Dordogne, named La Micoque, which is also usually thought to belong to the Upper Acheulean culture, though, as we shall see in the next chapter, this later industry has definite affinities with the flake implements of the caves.

Three distinct developments can be traced in the St. Acheul types. At the beginning of the period the characteristic tools are oval *coups-de-poing* differing from the Chellean forms by having the greatest thickness towards the middle and not at the butt-end. They are also much more finely made, and show no traces of the crust of the flint. Later, in the middle of the period, the round pointed end becomes more flattened, and in some cases the sides are twisted in the shape of an **S**. Although these are flaked on both sides, they are not infrequently prepared from large flakes. Finally, at the end of the Acheulean, the Levallois flakes and the La Micoque triangular axes appear. A spear-like fragment of wood has been found in an Acheulean deposit at Clacton in Essex, and it is thought that wooden tools may have been in general use at this time.

The presence of the straight-tusked elephant (*E. antiquus*) and Merck's rhinoceros in the gravels containing early Acheulean implements shows that the

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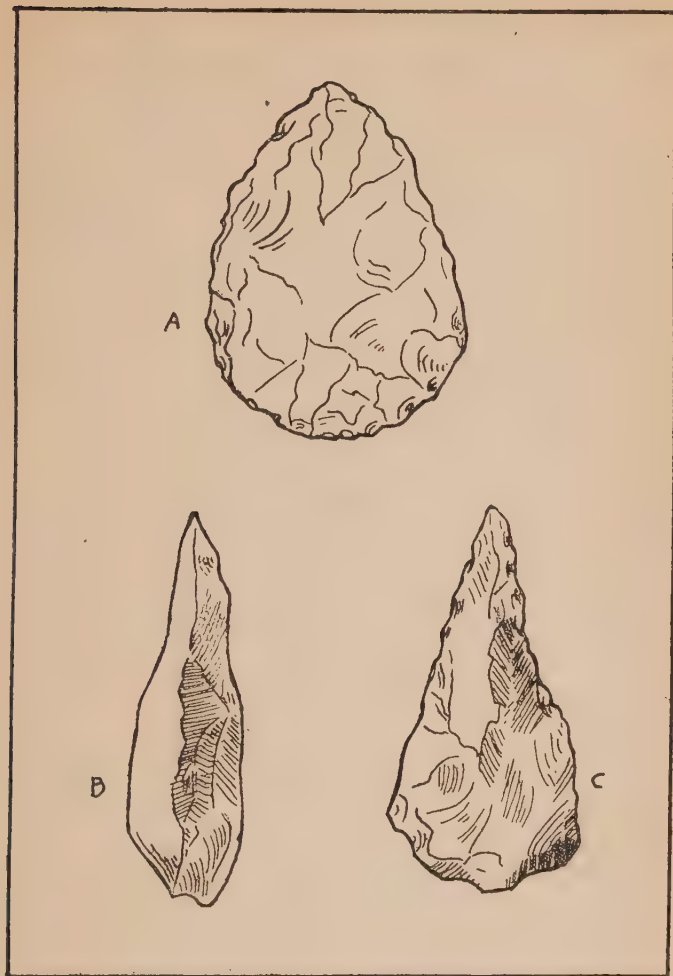


FIG. VIII.—ACHEULEAN AND LEVALLOIS IMPLEMENTS.
A. *Coup-de-poing*. B. Levallois flake. C. La Micoque axe.

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climate was still warm, until, towards the end of the period, high easterly winds swept over Northern Europe and caused these warmth-loving animals to beat a hasty retreat to the sunny south to spend the long winter of the approaching glaciation on the Riviera and the Spanish side of the Pyrenees. There is still some uncertainty, however, in fitting the early Palæolithic cultures into the geological sequence. The most satisfactory correlation at present, in our opinion, is to make the pre-Chellean period (with its various subdivisions) extend from the emergence of man, probably in the Tertiary era, until after the second glaciation (Mindel). The Chellean industry then falls in the Mindel-Riss warm interval when the second terrace at St. Acheul was laid down, and continues through the Riss glaciation until the latest forms of these tools finally disappear in the third (Riss-Würm) interlude, after the first terrace had been deposited. The Acheulean types begin in the Older loess which is pre-Würmian, and therefore this culture seems to find its place between the Riss and the Würm. But the group of industries contained in this loess is immediately preceded by a level of hand-axes of La Micoque type and Levallois flakes, suggesting that a culture allied to the Mousterian or Cave-industry occurred in the Riss and Riss-Würm periods. This, however, will become clearer in the next chapter.

Leaving these technical matters on one side for the moment, let us proceed with the drama, laying the scene first of all in the valley of the Somme, which at the time in question was a tributary of a great river that entered the Atlantic a hundred miles west of the present coast of Brittany, having passed through a broad forest-clad valley now the English Channel. The ridge from Calais to Dover constituted a watershed dividing the waters of the North Sea river (which included among its tributaries the Rhine, the Meuse, the Elbe, and the Thames) on the north-east, from the English Channel river (whence proceeded the Seine,

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the Somme, and the Sussex Ouse) on the south-west (*cf.* Fig. VII.). Probably the Somme was then continuous with the Aisne descending from the Ardennes, and it was not till later that the Aisne joined forces with the Oise. This explains why pieces of quartzite from the Ardennes have been found in the valley of the Somme. To those of us who are accustomed to travel to the French capital via Dover and Calais, it is perhaps a little difficult to picture Picardy and the Somme valley merely as an extension of Kent and Sussex, yet it was not until the very end of the Old Stone Age that the final separation of England from the Continent occurred, and when the Straits of Dover were formed, they were for a long time very much narrower than they are today, so that the Somme valley extended, even in the Neolithic, far to the west of its present mouth.

HEIDELBERG MAN (MAUER JAW).—Although numbers of men and women must have been living along the pleasant banks of the Somme and the Seine in the warm and sunny first and second interglacial periods, judging from the large quantities of stone axes (*coup-de-poing*) and scrapers belonging to these times that have been found in the gravels (especially in the third terrace), yet no human remains have been unearthed as yet in these deposits. To make the acquaintance of a representative of the widely scattered people who were responsible for these implements, we must extend our travels eastward to the charming old university town of Heidelberg, between the Rhine and the Black Forest. There we shall find in the University Museum, a building of modest appearance on the left-hand side of the main thoroughfare, or Haupt Strasse, going in the direction of the castle, a human jaw of extraordinary size and shape. On examining this important relic, the absence of a chin at once becomes apparent, and this, coupled with the massive proportions of the bones, gives it a thoroughly simian or ape-like appearance. It might have belonged to a gorilla, in fact, were

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it not for the teeth, which are quite unmistakably human. The chinlessness recalls the Piltdown jaw, but, although we can only conjecture what the rest of the skull was like, it is generally thought that it resembled that of the Neanderthal or Cave-men, with a low, sloping forehead and prominent brow-ridges, rather than that of the earlier Piltdown type. But to understand the significance of the Heidelberg jaw it is necessary to examine with some care the place where it was found. To this end we must make our way to Mauer, a village about six miles from Heidelberg, though rather farther by rail.

MAUER SANDS.—The line follows the course of the Neckar through well-wooded hills, till at Neckargemünd, a pleasant little town, the river is joined by a tributary, the Elsenz, the valley of which is ascended by a branch railway going in a south-easterly direction towards Heilbronn. On the eastern side of this valley is Mauer, about four miles beyond Neckargemünd. Near the station lies the village. Turning to the left on reaching the main road, noticing perhaps a stork's nest on the chimney of a cottage, for this is all that Mauer has to show the visitor unless he is of a scientific turn of mind—a short walk brings us to a cart track on the right-hand side of the way. This leads to a sand pit which for many years has attracted the attention of geologists on account of its Pleistocene deposits.

A brief survey of the district reveals some interesting facts. The cutting has been made in strata produced by a river in the Ice Age, raised to a height of 85 feet above the bottom of the Elsenz valley, the floor now reaching nearly to the level of the bed of the present river. On the surface is a layer of Younger loess to a depth of over 18 feet (5·74 metres), and below this is some 17 feet (5·18 metres) of Older loess, overlying the Mauer sands, which form the rest (15·62 metres, about 51 feet) of the section. It was in this sand, laid down by the river at the beginning of the Pleistocene period, that the bones of various extinct animals, such as the

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Younger loess,

Older loess,

Layer of clay

Mauer sands,



FIG. IX.—THE SAND PIT AT MAUER.

The X indicates the spot at which the Heidelberg jaw was found.

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ancient elephant (*E. antiquus*), the Etruscan rhinoceros (*Rhinoceros etruscus*), a little and big bear (*Ursus avernensis* and *U. deningeri*), the forerunner of the cave-bear (*U. spelæus*), the lion, several deer, a bison, and other species characteristic of a warm period at the beginning of the Ice Age. The Etruscan rhinoceros is more intimately connected with the Pliocene, it is true, but the remains of this animal were very fragmentary at Mauer, while the elephant being *antiquus* and not the earlier *meridionalis* (cf. p. 40) shows that the sands are Pleistocene. Some geologists think that they were deposited in the first interglacial phase, but Professor Boule and others place them in the next warm interval, thereby bringing them into line with the second terrace at Abbeville on the Somme, and the gravels at Chelles on the banks of the Marne. The animal remains and the stratigraphical evidence confirm this view. Unfortunately no human flints have been found in the pit, but the geological evidence suggests that the stratified sands came into existence probably in the warm interlude before the third (Riss) glaciation, when the Chellean industry was established in Western Europe. Professor Rutot assigns them to the cultural level which in Belgium has produced the very early Chellean or "Strépyan" implements.

It is important to get the date of this deposit fixed as definitely as possible, because it was in this lowest layer of the pit that the massive human jaw in the Heidelberg museum was discovered. For twenty years Dr. Otto Schoetensack, a lecturer in geology at the University (Heidelberg), had been paying almost daily visits to the pit in the hope of discovering the remains of some of the Pleistocene inhabitants of the Neckar valley. At long last, on October 21, 1907, a workman handed to him the remarkable jaw which he had removed from the sands, about 80 feet below the surface and very near the floor of the pit (see Fig. IX.), the day before. Here was probably the first known relic of the actual men who made the Chellean *coup-de-*

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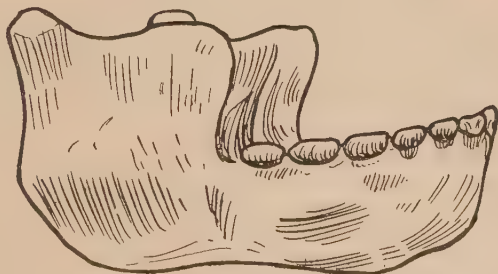


FIG. X.—THE HEIDELBERG MAN.

The upper figure shows a restoration by M. Mascré under the direction of Professor Rutot. Below is the actual jaw.

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point and scrapers, or possibly the earlier Strépyan tools. The rest of the skeleton, no doubt, is scattered in different places along the old river-bed, having been washed in pieces higher up the stream, and carried down, bone by bone, like *Pithecanthropus*. In the process the jaw has been discoloured, and marked by incrustations of sand, as in the case of the animal bones from these sands. Persistent efforts have been made since 1907 to find some of the missing parts of the Heidelberg skeleton, but at present no further bones have come to light. Judging from the jaw, this individual, whom perhaps we may regard as Chellean man, was a brutish-looking fellow with slouching gait and heavy features, more savage in appearance than *Eoanthropus* or even cave-man, but nevertheless more definitely human than *Pithecanthropus* (Fig. X.) His racial affinities may have been with the Neanderthal race inhabiting the caves in the middle of the Palæolithic, though he represents a distinct step downwards into the darkness that at present shrouds our forebears in the earlier and greater part of the Ice Age.

Considering the very large number of human implements belonging to the lower Palæolithic in Western Europe, Africa, Southern Asia, Arabia, Palestine, Mesopotamia, Hindustan, Cochin China, and Malacca, it is remarkable that the actual remains of the fashioners of these tools should be confined to one lower jaw. True, Professor Keith thinks that a skeleton found in 1888 at the top of Galley Hill, near Swanscombe in North Kent, belongs to the Chellean period, and he is inclined to regard the skull recovered from a gravel pit at Dartford in 1902 as the remains of Acheulean man. But the stratification in which these bones occurred is so very uncertain that, like their continental counterparts—as for example the jaw found by Boucher de Perthes in the Moulin Quignon pit at Abbeville in 1863—they are seldom now accepted as authentic by competent authorities apart from Professor Keith. This absence of human remains is probably due to these early

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people having lived a roving life in the open in the temperate climate of the interglaciations, encamping on the banks of certain rivers, and then moving on to pastures new. Thus they never stopped long enough in one place to leave any very considerable traces of their presence beyond a few flint implements. Their mortal remains were no doubt washed away with the "drift" by the rising rivers, as in the case of the Mauer jaw—for which reason we frequently speak of them as the men of the River "Drift"—leaving only their tools to testify to their existence during the vicissitudes of the Ice Age.

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CHAPTER III

CAVE LIFE

AT the very end of the Riss-Würm torrid interlude, and with the return of arctic conditions in the fourth and last glaciation, we leave the obscurity of the Lower Palæolithic and pass into the clearer light of the Cave period. Hitherto our knowledge of life in the Old Stone Age has been derived mainly from rude tools made of flint, and a few isolated human remains, often of doubtful provenance. We can picture early man wandering over the Sussex weald, or the Neckar valley, in company with strange and often gigantic animals, but we have nothing but our imagination to help us to fill in the details concerning his manner of life and the thoughts of his mind. This method, therefore, is better adapted to artists than scientists, and it can very easily lead to wrong conclusions, as in the case of the late Mr. Worthington Smith's dreary imaginary account of "the primeval savage." Consequently we have hitherto purposely refrained from making any attempt at this sort of reconstruction, in the present meagre state of the evidence. But with the Cave period comes more abundant data, from which it is possible to arrive at some definite notion of the life of the Cave-men.

- NEANDERTHAL MAN.—In the first place, the actual human remains are not confined to a few river drift examples, as in the Lower Palæolithic, there being over twenty examples of the so-called Neanderthal type alone from duly authenticated sites. Of these, the oldest in point of discovery is the skull found at Gibraltar as long ago as 1848. As this was eleven years before Darwin wrote *The Origin of Species* (1859), it did not attract attention until its true significance was realized in later times, after many similar representatives



FIG. XI.—NEANDERTHAL MAN.
(After a model by J. H. McGregor.)

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of this ancient race had been recovered from their cavern homes. The first of these finds was made nearly nine years later when, in 1857, workmen unearthed a skeleton of unusual appearance in a cave at the entrance to a small ravine called the *Neanderthal*, at Düsseldorf, on the right bank of the River Düssel, a tributary of the Rhine, about sixty miles north-east of Liège. The remarkable bones lay in the loam filling the floor of the cave in the limestone cliff, about 60 feet above the river and 100 feet below the surface of the plateau. In removal they were badly damaged, but the top part of the skull, the thigh bones, and the right and left humerus (the bone of the upper arm), and fragments of the shoulder blade, the pelvis and the ribs, were preserved and subsequently placed in the Rheinische-Antiquitäts Museum at Bonn, the German university town adjoining Cologne. Here they were examined with the utmost care by experts. The thickness of the bones of the skull, the low retreating forehead and heavy ridges overhanging the eyes, the prominent lower jaw and receding chin (Fig. XI.) were observed, but differently interpreted. Some thought that the brutal-looking skeleton could not be the remains of any ordinary human being, and so they explained it as belonging to a diseased person, or an idiot. Others regarded it as distorted by age, but Shaafhausen of Bonn maintained that it was "the most ancient memorial of the early inhabitants of Europe," an opinion supported by Huxley.

At the time of the discovery prehistoric archæology was in its infancy, if indeed it can be said to have come to the birth as a definite science. Therefore the site in which the skeleton was found was not treated as it would have been under the circumstances today. The remains were broken during excavation and removed in a haphazard manner without special notice having been taken first of the exact position of the bones in the deposit. Nothing was associated with them to throw any light on their age, although later the tooth of a bear was recovered from the cave, and some bones of Pleistocene

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animals (*Rhinoceros tichorinus* and *Elephas primigenius*) occurred in similar soil in an adjacent cave. There was, then, nothing to show very clearly that the narrow-headed forbidding individual belonged to prehistoric times. In the seventy years, however, that has elapsed since these discoveries were made, many similar finds have come to light in stratified deposits, proving the existence of a Neanderthal race or type, usually called *Homo Neanderthalensis*, widely spread over Europe in the fourth glaciation or earlier, having entered the continent probably from the east—perhaps from Northern Asia.

THE NAULETTE JAW.—The first of these was made in 1865, while the scientific world was thinking hard and arguing fiercely about the strange relic from the Neander ravine. The limestone caves which occur on the left bank of the River Lesse, familiar to travellers to the Ardennes in Eastern Belgium, attracted the attention of M. Edouard Dupont. After cutting his way into one named the *Trou de Naulette*, he cleared away a thick deposit of yellow clay at the entrance, containing reindeer bones. A quantity of débris that had fallen from the roof had to be removed next, and then he dug into the underlying strata, where, in the following year, his labours were rewarded by the discovery of a lower human jaw, and a canine tooth, 14 feet below the surface. The remains of the mammoth, woolly rhinoceros, bear, and reindeer, together with some flint-like implements, occurred in the same deposit. Although, like the Gibraltar skull and the Neanderthal skeleton, the Naulette jaw had to wait till later workers had added their testimony to these early finds before it was assigned its true place in the history of the human race, it is now recognized as having belonged to the same chinless, heavy-featured Neanderthal type of humanity.

THE MEN OF SPY.—The next great discovery was made twenty years later in this same district, eight miles from the industrial town of Namur, when in 1887 a party from the neighbouring university of Liège recovered from *Grotte de Spy*, a cave on the eastern side

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of a small tributary of the Meuse, the skeletons of two men of the Neanderthal type in a terrace in front of the cave, 14 feet below the surface. It now became clear that these human remains belonged to a definite prehistoric race, since with the bodies the same kind of tools were found as at La Naulette, and the bones of the mammoth and the woolly rhinoceros.

LE MOUSTIER.—The ball having been set rolling moved quickly. Caves in all parts of Western Europe, but especially in the department of France known as the Dordogne, revealed traces of their ancient inhabitants, and their handiwork, so that today over three hundred Neanderthal stations are known to archæologists in Europe, two-thirds of which are in France. Of these one of the most interesting is the site at the village of Le Moustier, six miles from Les Eyzies, the capital of Palæolithic France, on the right bank of the Vézère, a tributary of the Garonne. Near Le Moustier, behind the little town, are terraces containing caves, in one of which, about 90 feet above the river, Herr O. Hauser, a Swiss archæologist, commenced digging operations in the spring of 1908, flint implements characteristic of the middle part of the Old Stone Age having been found from time to time in the floor of the grotto, and under the cliff in front. When he reached only a depth of 5 feet below the surface of the cave, he came upon a Neanderthal skeleton of a youth about sixteen years of age lying on its right side, with the right forearm under the head, the skull resting on a pillow of flints. The body obviously had been laid to rest with the utmost care in the attitude of sleep. Near the right hand was a magnificent oval *coup-de-poing*, worked on both sides, and not far away lay a scraper. Numerous other flaked implements typical of the new industry which flourished during the fourth glaciation surrounded the body, while about the skull burnt bones of the ancient ox, the *urus*, were deposited. Here, indeed, was a remarkable find, full of priceless information for the reconstruction of the life of man in the

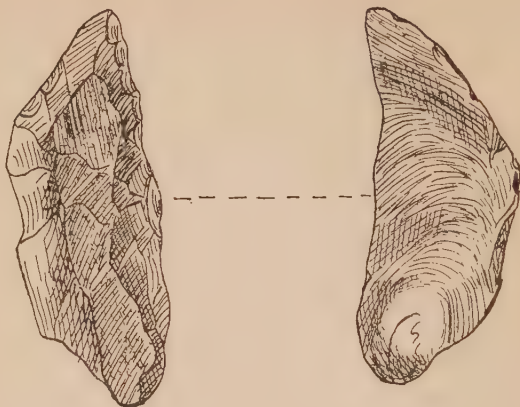
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middle of the Old Stone Age. The importance of the discovery was at once recognized, so that further excavation was stopped until the autumn, when, in the presence of an illustrious gathering of German anthropologists, the skeleton was carefully and solemnly removed. But notwithstanding all the precautions that were taken in its extraction, the skull was badly crushed and parts of the bones fell to dust on being uncovered. Nevertheless, it is on the whole the best preserved of all the Neanderthal remains. Later, through a series of unedifying commercial transactions, it passed to its final resting-place in the Ethnological Museum in Berlin.

THE MOUSTERIAN INDUSTRY.—It was pointed out in the last chapter that triangular axes and Levallois flaked tools found in the shelter at La Micoque (p. 70) have certain affinities with Mousterian types. The large Levallois blades, prepared by striking off flakes and making them into instruments, were, in fact, the forerunners of the more symmetrical "Mousterian points" characteristic of the Cave period. Tools of this type have now been found in association with warm fauna in the first terrace of the Somme at Montières near Amiens, where Acheulean forms would be expected. This suggests that the Mousterian method of tool-making began at least in the Riss-Würm temperate interlude. But at Crayford and Northfleet, on the Kent side of the Thames valley, a nearly identical industry occurs in a clay with cold fauna, apparently belonging to the Riss glaciation, and there is reason to think that the Montière implements may belong to the same period since the gravels are heavily charged with similar chalk. In this case, the Mousterian culture may well have come into being during the third glaciation, and continued through the succeeding genial phase and the fourth return of the ice. The recurrence of the La Micoque tools throughout this lengthy period indicates that the people who made these tools were wandering about in France and England. At present the problem is again rather like a jig-saw puzzle with many

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A



B



FIG. XII.—MOUSTERIAN IMPLEMENTS.
A. Mousterian points. B. Side-scrapers.

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of its pieces missing, and therefore the details of the picture must await further discoveries. But the general outline that is taking shape seems to be that of several groups of people making implements of the Mousterian pattern following and replacing one another, till finally, in the last glaciation, the cultures were fused into the Upper Mousterian. During this process the Acheulean interrupted the development of the Levalloisian forms. In the later Mousterian industry the *coup-de-poing* disappears and the typical Mousterian point and the *racloir* or side-scrapers predominate (Fig. XII.). Both these tools would be well adapted to boring holes, cutting and scraping skins, and M. Commont has even succeeded in sawing through a branch of a tree in a very few minutes with a scraper of this type!

MOUSTERIAN WORKSHOPS.—Doubtless every adult was capable of making flint implements in a Mousterian community, but the discovery of workshops in the sites exactly as the original owners left them, complete with finished tools, throw-outs, and heaps of chips on either side of the spot where the knapper has sat, shows that certain men must have specialized in the work. To them the rest of the settlement would generally resort, in all probability, when in need of implements, though no doubt they could have sat down and chipped a flint quite well for themselves. It seems, then, that even in those days "every man to his trade" was a recognized maxim. "Factories" of this nature have been discovered at Crayford and Northfleet near Gravesend in Kent and in many other places, and if we select for description here a site near St. Brelade's Bay on the south coast of Jersey, it is only because the present writer happens to have worked there a few years ago in the genial company of his friend Dr. Marett, and it is always better to talk of the things of which one has first-hand acquaintance.

LA COTTE DE ST. BRELADE.—The granite cliffs which form the coast of Jersey rise to a height of about 200 feet between Portelet Bay and St. Brelade's Bay,

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and tucked away within a large cleft with perpendicular sides in the cliff constituting the eastward bend of St. Brelade's Bay is a cavern excavated by the sea when the beach was 60 feet higher than it is now. This is known as *La Cotte*, and for many years it has attracted the attention of archæologists, flint implements having been found there since 1881. In 1905 the energetic local antiquarian society, the Société Jersiaise, decided to explore the cave systematically, but they were handicapped by the rotten and dangerous condition of the rock roof—a fact that became very apparent on September 3, 1915, when 500 tons of débris suddenly fell within measurable distance of the nine ardent archæologists at work inside at the time! Happily, however, their mortal remains were not buried beneath the rock rubbish to perplex future generations of anthropologists in their search for *Homo Breladensis*. Between 1910 and this unexpected conclusion to the operations in 1915, a thorough examination of the site had been made by Dr. Marett and his helpers, working in conjunction with the Société Jersiaise, with the result that thirteen very primitive human teeth were found near the remains of a fire, together with a heap of food refuse containing the bones of the woolly rhinoceros, the reindeer, the red deer, the prehistoric horse, and the ox. In other parts of the cave ashes occur showing that the secret of fire-making was known to *Homo Breladensis*, as Dr. Marett called the primitive inhabitants of the shelter.¹

FIRE.—This is not the first occasion on which evidence of fire in the haunts of Palæolithic man has been discovered, for hearths occur in Acheulean deposits, and they are very common in the Mousterian stations. The fact that some of the Red Crag implements from East Anglia show traces of fire has led to the suggestion that its use goes back to the Pliocene, but this is not

¹ Marett was led to suggest this distinctive name for this example of the Mousterians because Keith regarded the teeth as falling between the Neanderthal and Heidelberg types, but it does not presuppose a separate variety of humanity.

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at all likely as no hearths have been found before the Acheulean culture phase. Today no tribe exists, however primitive, without this knowledge, and, except in the case of such very rudimentary folk as the Andamanese, no tribe is unable to kindle fire artificially. It is probable, however, that early man became acquainted with the properties of fire first through accidental conflagrations due in some instances, perhaps, to volcanic action, or sparks flying about in the production of flint implements. But necessity is the mother of invention, and if we may hazard a guess, after he had in these ways become familiar with this strange and awe-inspiring phenomenon—regarded doubtless for some time as a sort of “devouring dragon”—he sought to use it for his comfort and safety. Having advanced so far, the next step would be to devise a means of lighting a fire after it had gone out.

FIRE-MAKING.—As the cold became more intense, forest fires can hardly have been an unmixed evil, and as they died down, attempts may have been made to rekindle them on a smaller scale for local use by adding wood to the glowing embers. Like the Andamanese, early man may have carried some of the red-hot ashes to the cave-dwellings to give warmth and protection. In this way an enemy may have been turned into a friend, and a powerful and invincible ally against the attacks of savage beasts. For doubtless it was observed that the fiercest animals were still terrified by it, and consequently men began to realize that they could dwell in their caves in complete safety by the simple device of making a fire at the entrance, while animals could be driven from their dens in a panic by throwing into them a lighted brand. Once this use of fire was known, a family would never feel quite safe without its ally at its door. This doubtless explains the numerous hearths found at the entrance of the Palæolithic caves, though, of course, they were also employed for other purposes, as the various uses to which fire can be put were discovered by accident, observation, and experiment.

As this invaluable asset to the life of man came to be

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more and more recognized as an essential part of his equipment in the struggle for existence, methods must have been devised to produce it artificially. The heat generated when dry branches of trees are rubbed together by the wind may have given a clue to the process of fire-making by friction, just as today savages frequently procure a light by rubbing a blunt-pointed stick in a groove made in another until the dust is ignited. This is a tedious business, but it is worth the trouble when it is a case of Hobson's choice. A more obvious possibility, perhaps, is that suggested by the sparks produced when flint is struck. If these fell on dry leaves they would sooner or later be almost certain to set them alight, and this accidental production of a fire may have inspired some observant genius to try and do likewise. Such an experiment would be calculated to attract considerable attention in the camp, and become more than a nine days' wonder. The news would spread rapidly, as it always does among primitive people, and fire-making would soon become the "craze" in Moustertian communities. These, of course, are merely guesses, but as we have no data to guide us scientifically except the bare fact that Neanderthal man did have fires in his caves, we can only surmise how he may have kindled them.

One thing, however, is quite certain. Whatever method he adopted to produce it, the introduction of fire had far-reaching consequences in the development of community life. Hitherto, apparently, Chellean man had lived in the open, but with the change of climate, and the acquisition of the knowledge of fire as a means of protection, his successors resorted more and more to the larger openings of the caverns and rock shelters. Here the flint-knappers carried on their craft, and at La Cotte de St. Brelade the Neanderthal Jersey men seem to have found business very brisk; for during the excavations in 1915 alone, we collected no less than 5,000 flint fragments and about as many pieces of bone were found in the workings before the roof collapsed, while the

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museum of the Société Jersiaise at St. Heliers has an extensive and magnificent collection of implements from the cave. Altogether Dr. Marett claims to have sorted 15,070 fragments of flint and 854 pieces of other stone used by man from La Cotte, the whole weighing about a quarter of a ton! Clearly this was a factory and not a mere family tool-shed, especially as there is no flint in the cave which was not taken there by man. There is, in fact, no native flint in the island, and the sources of supply from which the original inhabitants drew their material must either now be under the sea (and this may account for the flint pebble among the shingle on the beach) or it was brought from a greater distance while the island was still joined to the mainland. But wherever may have been the geographical source, there is nothing to suggest that there has ever been any flint in the cave which has not been introduced by the hand of man for the express purpose of making tools. It seems, then, that the shelter was a factory which imported large quantities of material and turned out implements on a considerable scale.

That this cave was occupied on two separate occasions with a considerable lapse of time between them is clear from the fact that the first 4 feet of breccia (*cf.* p. 63) contained coarse, heavy, flaked implements and one triangular sub-oval *coup-de-poing*, together with the remains of an early species of elephant, which may have been that called *Elephas trogontherii*, but certainly it was not the mammoth. This is suggestive of a pre-Würmian period, corresponding in some respects to the La Micoque horizon in France (*cf.* p. 70). Above this is a sterile layer of fine white dust, suggesting that the cave was then deserted for a considerable time. On top of the dust came 6 feet of loose rock rubbish mixed with loam, in which a number of well-made implements of Upper Mousterian pattern occurred, associated with the bones of the mammoth. Crowning the whole was a bed of lemming, covered by 30 feet of sterile clay and rubbish, known as "head."

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This sequence supports the Abbé Breuil's contention that the Mousterian was a much longer period than has generally been supposed (*cf.* p. 72), lasting over the Riss, Riss-Würm, and Würm glaciations. Thus in the lower level at St. Brelade, *Levallois* flakes were found together with a *coup-de-poing*, suggestive of pre-Würmian times; while in the cave on the north coast, La Cotte de St. Ouen, an early type of Mousterian tools with the La Micoque cordiform point may well belong to the Riss-Würm interglacial phase. The upper layer at St. Brelade contained the later types of Mousterian flints, characteristic of the Würm epoch. It is therefore by no means improbable that the first occupation of this cave occurred in the Riss or third glaciation, but during the warm interlude that followed it was deserted in favour of St. Ouen, having a northern aspect. But with the return of the ice for the fourth time (Würm), the later Mousterians took up their quarters in the shelter on the south coast overlooking St. Brelade's Bay.

LIFE IN MOUSTERIAN TIMES.—It would be a mistake to suppose that Neanderthal man spent all his days in the dark and deep recesses of rock shelters, or even lurking about in the entrance to his abode. On a hot day in the short summer during a glaciation, or as a shelter in a heavy storm, a limestone cave doubtless proved satisfactory, but it can hardly have been a very congenial habitation in wet seasons. Limestone being porous, rain has an unhappy knack of percolating through and dripping from the roof after awhile in the most uncomfortable manner. When this process begins, it may be a great deal wetter indoors than out, and this is probably one of the reasons why Palæolithic man did not inhabit the inner recesses of the caves. But apart from climatic considerations, there was the question of the food supply to drive him forth into the open to hunt the wild horse, the ox, and the straight-tusked elephant, and, as the ice increased, the mammoth, the woolly rhinoceros, and the cave-bear.

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HUNTING.—When one looks at a collection of Mousterian implements in a case at a museum one may well ask, How was it possible for a mammoth, protected by layers of fat and wool as well as a thick coat of fur, to be in the least affected by a flint spear or dart? A Mousterian point on such a creature must have made about as much impression as does a tin-tack on a modern motor tyre. Even supposing that slings were known, it is very doubtful whether the throwing stone would penetrate the hide of the larger arctic animals. It is therefore obvious that Cave-man must have reinforced his weapons by his wits in the conduct of the chase, adopting, in all probability, devices similar to those employed by the modern savage, such as making invisible holes in the ground, into which an unwary animal falls on his way to the river.¹ Simple traps like this were doubtless the means by which man overcame the superior strength of his prey, while by his discovery of fire he also had at his disposal an invaluable weapon to assist him in confusing and catching game.

THE HOUSING QUESTION.—Not only had man to seek his food among creatures having infinitely greater size and strength than himself, but he also had to do battle with them for a shelter. As the glaciers filled the valleys of Northern Europe at the beginning of the Cave period, and England's green and pleasant land was transformed into a bleak arctic region, the housing question became more and more acute. The holes and crevices of the limestone cliffs had long been the habitation of bears, lions, hyænas, and other formidable tenants. True they paid no rent, but possession was then nine points in the law as it is now, and let a Neanderthaler in search of a house call upon the occupant and see what happens! Clearly if man was to dispute with the beasts for a house, he

¹ Life in a hunting community is realistically described by Max Begouen in his prehistoric romance *Bison of Clay* (translation by R. L. Duffus, 1926), though the picture is slightly overdrawn.

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must pit his resourcefulness against their strength. Exactly what methods he adopted we can only surmise, but we do know for certain that somehow or the other, unlike his twentieth-century successor, he succeeded in ousting the occupant. Miss Davison has pictured the scene in this way: "We can imagine a few pioneers creeping from tree to tree through the forest," she says, "and crouching in the bushwood at the entrance to the cave. With a shout they would fling their burning brands into the cave, and then run for their lives to places of safety. What a panic there would be in the caves! The bears rushing to the entrance, tumbling over each other, would be badly singed and choked and blinded with smoke. Howling with pain and fright, they would dash into the forest as far as possible from the terror that flew into their caves. The men hiding in the tree-tops, at first hardly daring to breathe, listened to the howls growing fainter and fainter, and as they died away ran back to their families to tell the good news. They would pick up more lighted logs, and, telling the children and women to follow with piles of dry wood, soon would have a great fire blazing at the entrance to the cave, which enabled them to feel tolerably safe to await the return of the outraged occupants. With what grunts of satisfaction the family must have gathered round that fire, revelling for the first time in an adequate protection from the weather."

CAVE LIFE.—In some such way as this, probably, Neanderthal man became master of the caves, and as the cold increased, doubtless he spent more and more time at home. When the weather permitted, or necessity demanded, he would go forth in search of supplies of food, skins, and oil, to reset his traps, and generally busy himself in the open; but on wet and snowy days—which, alas! increased as the temperature continued to fall and then suddenly rise—and during the long winter evenings he would sit round the fire with his fellows, feeding it from time to time with wood,

and trying his hand, perhaps, at making implements from pieces of flint. Conversation must have been somewhat limited in those days, but a low murmur of quasi-human voices would be heard among the assembly. The women, no doubt, prepared the meals, cooked such supplies as came to hand, and possibly made the skins into coverings for the body to keep out the cold, though tailoring does not seem to have flourished to any extent until the next period, when needles begin to appear. The first scrapers, however, were probably used for scraping skins which very likely constituted the earliest attempts at clothing.

All these operations seem to have been performed at the entrance of the caves, just under the shelter of the cliffs, where the refuse heaps, or kitchen middens, and hearths are usually found. As we have seen, the deeper caverns were unsuitable for permanent habitation owing to the dampness, and even the grottos were not the healthiest of abodes. It is hardly surprising, then, that some of the Neanderthal skeletons show signs of disease caused by dampness. Nevertheless, this mode of life had the advantage of bringing people together, and thus acted as a powerful stimulus to social and family life.

SOCIAL LIFE.—Man by nature is a "social animal," and however attractive the adventures of Robinson Crusoe may be to youthful imagination, the story is not really true to life because it presupposes conditions that do not actually exist on "desert islands." There is, of course, no foundation for the theory entertained at one time that the adventures of Crusoe are allegorical and relate to Defoe's own experiences. If a man were shipwrecked and stranded in the way described in this immortal romance, he would be exceedingly fortunate if he found himself on an island uninhabited by savage animals, and even so, he would not be able to maintain his own requirements entirely alone, however ingenious he might be. Human beings, in short, need the society, help, and protection which

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the one gives to the other both in prosperity and adversity. In the nomadic life of the earlier periods of the Old Stone Age probably there was little to encourage social intercourse except the bare necessities of co-operation in the chase and the care of the children during the prolonged helplessness which distinguishes the human infant from the young of other animals. It was very likely as a result of these practical considerations that the family and community instinct developed at a very early stage in human society and found expression in home life and tribal organization. Family and parental instincts have been observed among the anthropoid apes, as well as among other animals whose offspring are numerically small and need constant attention during infancy. Family life, including marital and paternal care, was not less indispensable for early man than it is for the gorilla or the gibbon.

Among people in a primitive state of culture the individual scarcely exists as a separate entity. He is always sacrificed to the tribe, being compelled to believe what the rest of the community believe, to follow their customs, and never to act spontaneously. Primitive laws represent the customs approved by the community, and the ethical standard of primitive man is consequently social rather than individual, his morality being the result of the reign of custom and social suggestion. This sociability is characteristic of all modern races that are still in the stage of society wherein men live by hunting, as, for example, the natives of Australia. Since we know that man in the Old Stone Age was a hunter, there is reason to think that it also represents his attitude of mind, which doubtless found expression in a similar social system.

MARRIAGE.—This family and community instinct must have received a tremendous stimulus when Neanderthal man adopted cave life, and thus came into more intimate contact with his fellow-men. This doubtless led to the organization of a rudimentary social and religious order. It was at one time

supposed that the original condition of human society was a promiscuity in which each man paired with any and every woman like the lower animals. But this crude theory has now been given up by all well-informed persons, except possibly in political circles in Russia, because nowhere does such a state exist today among primitive people, it being contrary to human nature. Thus, for instance, of all the tribes in Central Australia described by Messrs. Spencer and Gillen, there is not a single case in which marriage in some shape or form is unknown. The regulations controlling this institution, in fact, are so complicated that the table of "prohibited degrees" in the English Book of Common Prayer appears decidedly simple by comparison with these rules. Moreover, in the most primitive communities, normally a man has only one real wife, though he may be allowed to contract supplementary unions with other women, but only if they are in a special relationship to him by belonging to a particular marriage-group. Among all known communities, therefore, marriage is carefully regulated; as Dr. Westermarck, the leading authority on this subject, says, "there is not a shred of genuine evidence for the notion that promiscuity ever formed a general stage in the history of mankind."

Furthermore, as the same writer points out, "monogamy is the form of marriage that is permitted among every people. Whenever we find polygamy (the marriage of one man to several women), polyandry (the marriage of one woman to several men), or group-marriage (the union of more than one man with more than one woman), we find monogamy side by side with it. On the other hand, it is also in many cases the only form of marriage which is permitted by custom or law." This was no doubt due to economic causes and social circumstances. In a hunting stage of society, the less people a man has dependent upon him the better, and a large family is a hindrance rather than a help in the struggle for existence. Living as he did an active

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outdoor life, the desire for offspring was less intense than in later times when wealth began to accumulate, and the proportion of the sexes was disturbed by the marriageable males being killed off in the destructive wars that followed. Thus we find polygamy belongs essentially to the more advanced civilizations like those of Egypt, India, Mexico, and the ancient East, where in Israel Solomon, at the height of his prosperity, is accredited with no less than "700 princesses and 300 concubines" (1 Kings xi. 3). Even on the more probable estimate of the Book of Songs (vi. 8), threescore queens and fourscore concubines would be an intolerable burden under Palæolithic conditions. It was not until the discovery of agriculture and the domestication of animals gave increasing openings for female and child labour, and at the same time stimulated the desire to possess, that the tendency developed to multiply wives and create very large families. But apparently in the beginning it was not so.

THE FAMILY.—In the wild life of the chase in the Old Stone Age, probably the family consisted of parents and children, though the father was doubtless somewhat of a stranger in the camp since he was obliged to be away from home for many days on end in search of food. The wife therefore very likely lived in the same settlement as her own relations, where she was visited from time to time by her husband, as in the case of Delilah and Samson. This custom of the wife staying among her own people is called *matrilocal marriage*. Under these conditions descent is reckoned *matrilineally*—i.e., through the mother and not the father—just as it is she who has the care and control of the children—*matripotestal authority*. This system is known as "mother-right," or *matriarchate*, and there is reason to think that it is the basis of human society rather than "Father-right," when the father rules the family, as among pastoral people like the "Patriarchs"—Abraham, Isaac, and Jacob. One of the best examples, in fact, of this later stage of society under pastoral conditions

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and despotic male authority is the graphic picture displayed in the Book of Genesis. It was, however, a highly specialized manner of maintaining life, and very different from the simple monogamous matriarchal life of the chase.

All this shows, moreover, that the popular notion of Palæolithic man as a howling tyrant, biting and fighting the other males for a mate at the imaginary "pairing season," and finally carrying her off by her hair, requires some modification in the light of the scientific evidence, so far as we know it at present. The Palæolithic family may not have lived exactly under the sheltered and idealized conditions of a Garden of Eden, but there is very good reason to believe that in primeval society a man left his father and mother and clave unto his wife, and that at first, while man probably reigned supreme in the tribe, it was the woman who ruled the home. It is not improbable, however, that the enforced presence of the father in the settlement during the Cave period led to male supremacy beginning to assert itself more and more in every department of tribal life. Being stronger than the mother, the man's influence would soon be felt over the children, and incidentally over the wife. But even in the Cave period family life must have had many interruptions, for a hunting community does not usually have a fixed abode. Having few belongings, it tends to move from place to place, and shelter to shelter, in search of game. Therefore, although the father was compelled to stay indoors a good deal, when glacial conditions prevailed, so long as he was occupied with the chase, the patriarchate in all probability was not definitely established, as in the later agricultural and pastoral society.

RELIGION.—Besides this stimulus to social life and family intercourse which cave-dwelling seems to have fostered, it also apparently directed the attention of man to the unseen world. In the free life of the plains and river-banks, there was less to turn his thoughts to the supernatural and mysterious than in the dim recesses of

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the caves. This, however, is not to deny that the human race at any time was entirely oblivious to the higher orders of reality. The sense of mystery and the germ of a distinction between the natural and the supernatural are found even among the lower animals. The horse, for example, is afraid of the whip because he has discovered its function, but a strange and uncanny object on the road, such as an umbrella opened before him, makes him *shy*, because for him it is "supernatural." Similarly, dogs bark when they hear a knock at the door, but during a thunderstorm they frequently become scared, and slink under the table or seek safety in the kennel. This dread of the weird and the unknown seems to be the basic factor underlying the manifold expressions of religion everywhere, and it is difficult to imagine a time in human history when it did not exist.

We know that today primitive people regard unfamiliar and extraordinary objects and events with religious awe—such as a peculiar mountain, rock, or tree, a bubbling stream, an unusual animal, or a strange herb—and we may well believe that in all ages the sense of wonder in the presence of nature has been one of the primary impulses of religion. To the primitive mind the familiar is the natural; the unfamiliar is mysterious and therefore supernatural. From the uncanny feeling apparently experienced by many animals in the presence of sights and sounds they do not understand, it is but a step to the shuddering dread of religious awe which finds expression in the cry, "How dreadful is this place!" It is this emotion which lies behind the notion of sacredness, worship, and God. In the animal world it seems to stop at mere gruesomeness, but by man it is not only felt but given a valuation. Thus he becomes a religious being.

At first, of course, the explanation of this *mysterium tremendum*, or religious emotion called forth by the sense of mystery was very crude and undefined. As the lightning shivered the trees and the thunder crashed

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amid torrential rains, early man doubtless felt himself in the presence of a Power which he did not understand. He became aware of a transcendent Something which he could not explain, and so he postulated the existence of a "not himself" that is alive. This living Reality behind and within the universe was soon interpreted in terms of symbol and myth, while tribal traditions containing a record of historical facts assumed a mythological setting. Thus the careful analysis of a complex story of creation will often reveal that the mythical ancestors represent real persons, and their movements are the memory of the former migrations of the tribe. Primitive man, as we shall see later, is inclined to dance out his religion, to express in symbolic and dramatic form the hopes, fears, and passions which lie deep down in the unconscious mind of the community. A story like that of Cinderella, for instance, is an attempt to express symbolically the hopes of the neglected and oppressed, while the great myths of Greece and India represent race experience and race reflection at a very primitive stage enriched and refined by later thought. In Christianity, on the other hand, we find the reverse of this process, since it originated as the climax of the highest development in Hebrew religion, and, apart from the special Divine revelation it claims to have received, it reflects the maturity of the soul of a people which for a thousand years had been concentrated on the religious quest.

It was probably not until man became conscious of his own personality that he thought of God as a person. In the beginning the question as to whether the living Reality behind creation should be called "He" or "It" is not very likely to have arisen. At first the religious attitude may not have been far removed from that of the author of Psalm xxix., to whom the thunderstorm that passed over the country was a revelation of God, a religious experience of the most exalted kind. We miss the point if we suppose that the poet meant to say that the thunder was caused by God speaking. He had

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been greatly thrilled by the storm, and in his exalted state of feeling his emotion became religious—he heard God's voice. In all probability it was very much the same with early man. With questions of dogmatic theology he would not be much concerned, occupied as he was with the struggle for existence, but at times Nature in its awesomeness would be too much for him, and as his sense of wonder deepened, he became aware of the supernatural spontaneously, and gave it such valuation as he was able.

IMMORTALITY.—With the adoption of cave life, doubtless he became more conscious of the Unseen World of the mysterious and its perplexities. The silent, gloomy recesses of his cavern home were themselves awe-inspiring, as anyone who has visited them can testify, and in the next chapter we shall see that he frequently penetrated these dark inner chambers for religious purposes. As one by one his companions “slept the sleep that knows no waking,” it may well have been, as Professor Macalister surmises, “the survivors would ask one of another the question of questions, which has passed down ever since from graveside to graveside through the generations, ‘If a man die, shall he live again?’” As they sat round the fires and discussed this momentous problem, one would tell of a dream that he had had in which the dead had appeared to him; another would relate how something, he knew not what, but which surely was not of the common things of Nature, had startled him when he was wandering abroad in the gloom of the forest. With the weird dancing shadows cast by the fire on the rocky wall of their cave, with the wild noises of nocturnal nature all around them, small wonder that they found to their question an affirmative answer. Already even the lowly mousterian man, degenerate though he may have been, was conscious of something more than merely animal within him: already he had begun to look forward to a life beyond the grave—a life like that to which he was accustomed, for he could conceive of

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none other, where he would need food and clothing, and the instruments for procuring them. As his comrades passed, each in his turn, into the silent land, he laid beside their bodies such things as he imagined would minister to their necessities in the mysterious Otherworld."

In this way may be explained the ceremonial burial found at Le Moustier, while a few miles away, on the western side of the valley, M. Peyrony, the schoolmaster at Les Eyzies, discovered in 1909 a similar Neanderthal interment in a rock shelter at La Ferrassie. The body with the legs drawn up had been simply laid on the ground about 10 feet below the surface, with the head and shoulders protected by slabs of stone. In the same deposit were the remains of two children with Mousterian implements and fragments of the bones of bison, reindeer, and horse, evidently the remnants of a funeral feast. About the same time the Abbés A. and J. Bouyssonie and Bardon found in a small low-roofed cave near the village of La Chapelle-aux-Saints, seventy miles to the east of the Vézère, in the department of Corrèze, a Neanderthal skeleton lying in a small pit near the centre of the passage. As at La Ferrassie, the limbs were drawn up in the flexed position, and the head was protected by flat stones, other stones surrounding the skeleton. Mousterian flints, estimated at two thousand, and the bones of the woolly rhinoceros, reindeer, ibex, bison, cave-hyæna, and other cold-loving animals, occurred in the deposit, while above the skull were the leg and foot bones of an ancient type of ox, and pieces of quartz, flint, ochre, and broken bones were arranged round the skeleton.

Here was clearly a ceremonial interment, the body having been buried with the greatest care and apparently in the attitude of sleep. The cave was much too small to have been a dwelling, measuring only 13 feet at the widest part, and entered through a tiny opening where a fire had been lighted, presumably after the burial. It would seem, then, that it was a *tomb* at which funeral ceremonies of some elaboration had been performed,

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possibly including a feast. In a trench inside the cave there was a rhinoceros horn which may have been an amulet to give life to the dead. At Krapina near Agram, in Croatia, charred bones and a Neanderthal skull with cuts on the head have been thought to indicate that the people at this station practised cannibalism, but there is no definite evidence that the custom was adopted in the Cave period.

From these examples of ceremonial interments, it is plain that the Mousterians believed in a life after death. How far they had arrived at a notion of a land of the dead it is impossible to say, but judging from the position of the bodies in the attitude of sleep, and the implements and offerings of food with which they surrounded the body, it would seem that they were anxious to make the deceased as comfortable as possible. Some think that the limbs were flexed to prevent the return of the departed to disturb the living, others that it was an imitation of the pre-natal attitude and had reference to a new birth beyond the grave. Leaving on one side these rather fanciful interpretations, Neanderthal man had undoubtedly begun to think about the eternal problems of life and death, and to make some provision for the future life.

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CHAPTER IV

THE CAVE-ARTISTS

THE long winter of the Würm glaciation at length showed signs of coming to an end, and the more congenial conditions of the Achen oscillation prevailed. The climate was still cold and damp, yet the air became warmer and drier by degrees. It was cold enough in winter, however, for the mammoth, the rhinoceros, the cave-bear, the reindeer, and the musk ox to survive, though in dwindling numbers, but the wild ass and the horse took possession of the open plains of Europe, and deer, foxes, and weasels inhabited the forests which began to flourish again. But, alas! Neanderthal man, who had struggled so bravely against the adverse climate of his generation, never lived to see these more congenial conditions, and enjoy the happy hunting grounds of the Upper Palæolithic; for with the close of the Mousterian period shortly before the first maximum of the Würm glaciation (c. 23,000 B.C.) he became extinct in Western Europe.

HOMO SAPIENS.—Exactly what occurred to bring this race to an abrupt end it is impossible to say, but it is now clear that new races of a higher type of humanity took possession of the chase in Europe as the ice retreated. The newcomers were in no sense of the word a derivative from the earlier cave-dwellers, but where they originated has not yet been satisfactorily determined. Modern man, *Homo sapiens* as he is called, is known first from the north-west area of the Old World, chiefly from Europe, and several sub-groups of the species were established here as early as the Aurignacian period which immediately succeeded the Mousterian. But this implies that somewhere or other this higher type had gone through a long history before it reached Europe with this new Aurignacian culture. Mentally and physically it was far and away superior

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to the primitive Neanderthalers with their low retreating foreheads and slouching gait.

THE "RED LADY" OF PAVILAND.—The number of skeletons belonging to the earliest examples of modern man are far too small to enable us to argue with confidence about races and migrations, but from the evidence we have it is thought by some that the invaders made their way into the continent from North Africa over the land bridges that connected with Spain and Italy, while others came from the east. Having reached Europe, this tall, well-built, quick-witted race of hunters soon overcame the crude Mousterian inhabitants, and established themselves not only on the Riviera and in the Dordogne, but as far west as Wales. The first discovery, in fact, of a member of this higher type, or *Homo sapiens*, was made in a cave called Paviland, in the limestone cliffs of Glamorgan on the Gower coast, overlooking the Bristol Channel. Today a perilous climb along the face of a nearly perpendicular cliff has to be undertaken in order to reach the commodious natural shelter, but when it was inhabited by our remote ancestors, the land was on a much lower level than it is now, and it could easily be entered from the beach. In those days it must have been an ideal home for hunters, surrounded as it was by fertile ground, and within being roomy (60 feet in length and 200 feet broad), dry, and having a natural chimney to give ventilation and an outlet for the smoke of the fire. That its advantages were estimated at their true value is evident from the large quantities of kitchen refuse on the floor, 6 inches below which part of a skeleton of a tall man was found by Dean Buckland in 1823, embedded in soil containing iron ore and in association with the skull and tusks of a mammoth, flint implements, sea-shells, and objects carved in ivory. These may be seen in the University Museum at Oxford.

The human bones were stained with a dark brick-red colour from the earth in which they were buried, and consequently the remains were described by Buckland

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as the "Red Lady," whom he supposed to have been an ancient Briton who sought safety in the cave during the Roman occupation of Wales. There the matter rested till 1911, when the French archæologist, M. Cartailhac, visited Oxford, and confided to Professor Sollas his belief that the interment belonged to the earliest phase of the Upper Palæolithic. The following year this opinion was confirmed after Professor Sollas and the Abbé Breuil had paid a visit to the Paviland cave. Thus the "Red Lady" assumed her rightful place in history, but in the process she changed her sex, for on further examination it turned out that the bones were those of a tall man, analogous to the other remains of the athletic hunters who succeeded the Mousterians.

AURIGNAC.—This conclusion was the result of a series of investigations which had been carried out, principally in France, in the years preceding Cartailhac's visit to Oxford in 1911. In 1852 a French workman, while trying to remove a rabbit from a burrow on the lower slope of the Pyrenees, about 60 feet above the small stream named Rhodes, near the town of Aurignac in Haute-Garonne, drew out a large human bone. A slab of stone was subsequently dislodged, and a grotto revealed filled with the remains of seventeen skeletons, which the mayor ordered to be given Christian burial in the parish cemetery, despite the fact that actually they belonged to prehistoric men and women! Eight years elapsed, however, before the true significance of the cave and its contents was known, after M. Lartet had undertaken a thorough examination of the floor. Outside the stone slab he discovered the remains of a hearth together with flint implements, tools shaped from reindeer horns, and the bones of the mammoth, woolly rhinoceros, cave-bear, bison, hyæna and the elk. This proved that the shelter had been occupied in the Old Stone Age. The animals suggest the Würm glaciation, but the flints, like those found at Paviland, although betraying Mousterian influence, were made from longer flakes with one edge

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trimmed with coarse secondary chipping, the opposite edge having been left untouched (Fig. XIII.).

AURIGNACIAN INDUSTRY.—It now became apparent that a new industry developed at the close of the Mousterian period, for flint knives in these later sites frequently took the form of an *engraver* or *burin*, as the French called it, with a small edge at right angles to the plane of the blade. This tool was used for making engravings of animals and other designs on bone and ivory, an art that began at this time. The side-scraper which was so plentiful in the earlier sites was often replaced by the *end-scraper*, fashioned like a spokeshave, employed perhaps in shaving down the shafts of spears. Keeled, conical and hump-backed planing tools were prevalent, while implements of bone and horn, such as bodkins with a barb at one end to pull them through the skins after they had pierced a hole, occur in the lower stages of the industry. Towards the end of the period the tools were much smaller, and a number of minute forms have been found in the later deposits. Although all these types were not represented in the grotto near Aurignac, the industry has been named *Aurignacian* because it was at that station that Lartet recognized the new culture.

CRÔ-MAGNON.—In 1868 fresh light was thrown on the problem of the Upper Palæolithic by a gang of workmen engaged in the construction of the railway connecting Périgueux with Agen. Adjoining the village of Les Eyzies, an old rock-shelter was opened at Crô-Magnon, now part of an hotel on the main road near the station. When this discovery was made known to the Minister of Public Instruction, a thorough investigation of the site was commenced under the direction of M. Lartet, with the result that the skull of an old man was found at the back of the grotto, with two of his fellow tribesmen—tall, robust young men—and his wife and baby. A tragedy of some kind seems to have occurred, since the woman's forehead showed signs of a deep wound inflicted by a sharp instrument, and the

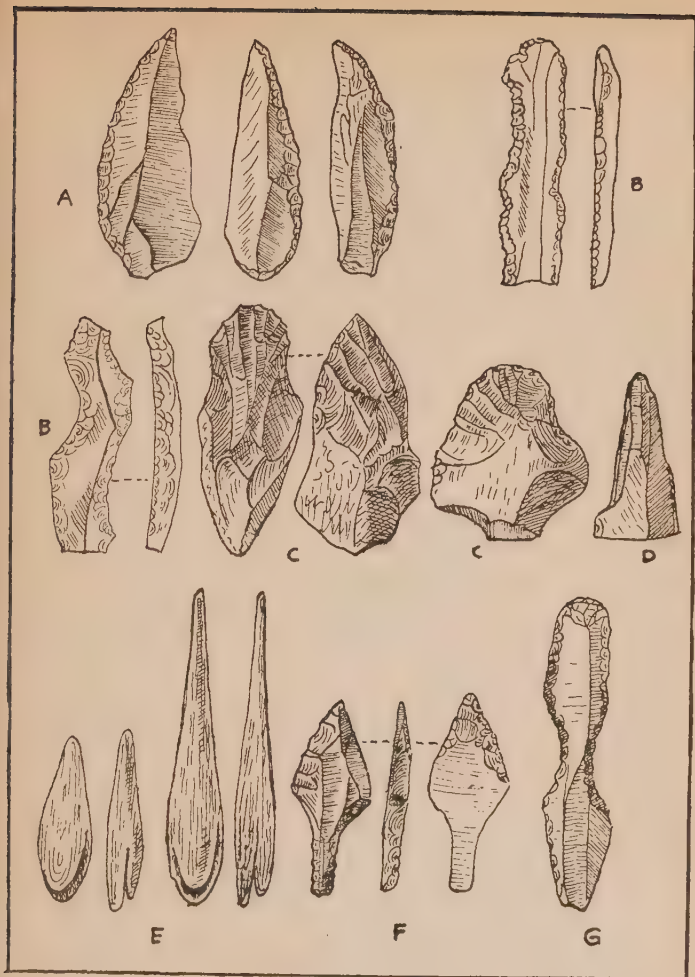


FIG. XIII.—AURIGNACIAN IMPLEMENTS.

A. Châtelperron points (after Breuil). B. Notched blades (after Obermaier). C. Keeled scrapers (after Obermaier). D. Borer with central point (after Obermaier). E. Bone points (after Breuil). F. Robert points (after Obermaier). G. Spokeshave (after Breuil).

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baby had been prematurely born. Was it a family quarrel or an accident? Under whatever circumstances they may have died, they were buried with the greatest care and ceremony, over three hundred marine shells having been laid with the bodies, perhaps strung together to form necklaces, as well as other amulets such as perforated teeth and ivory pendants.

The skull of the old man was in excellent preservation, and revealed a high degree of intelligence with its well-developed pre-frontal region and large cranial capacity. Moreover, the bodies, like the brains of these Crô-Magnons, were up to the modern standard, and taller than the present-day inhabitants of the Dordogne, the men standing about 5 feet 11 inches, while on the Riviera members of the same type measured as much as 6 feet $4\frac{1}{2}$ inches. In appearance they must have been decidedly good-looking, but, unlike most long-headed people, they had comparatively short broad faces with high cheek bones, features which incidentally may still be observed in some of their shorter descendants in the neighbourhood of Les Eyzies, while the same peculiarities occur among some of the Indian tribes about the Himalayas (Fig. XIV.).

The name Crô-Magnon has been widely used as a label for Upper Palæolithic man as a whole, with the exception of two skeletons said to be "Negroid" from Grimaldi, but it now appears that various sub-groups of "modern man" existed in the later part of the Old Stone Age. Unfortunately the skull was missing from the human remains of the Paviland cave, but the rest of the bones suggest that the "Red Man" belonged to the Crô-Magnon type. Despite the confusion that has arisen by placing all the long-headed Upper Palæolithic races under one title, the old man at Crô-Magnon nevertheless appears to have belonged to a widely distributed form of humanity. Thus, in the seven caves (originally there were nine) on the Mediterranean coast at Grimaldi, on the Italian frontier, between Mentone and Ventimiglia, several representatives of the variety occur.

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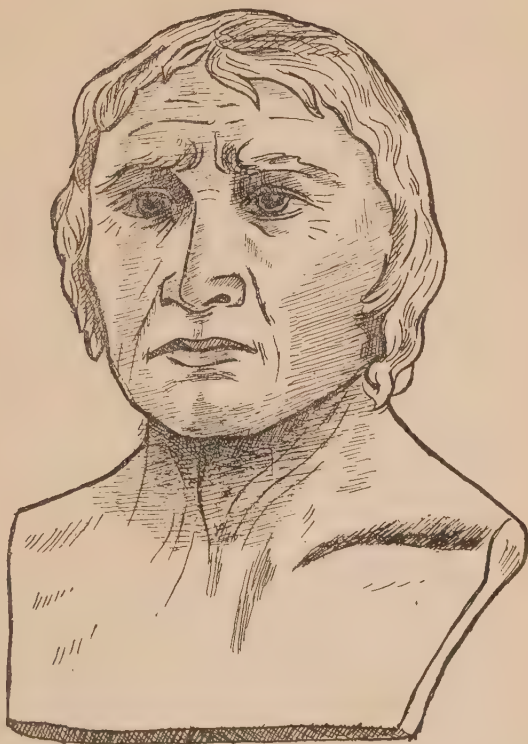


FIG. XIV.—CRÔ-MAGNON MAN.
Adapted from a model by J. H. McGregor.

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In the first of the series, that called *La Grotte des Enfants*, one such skeleton has been found, having a definitely Crô-Magnon face with a very long and high head. At Barma Grande, the fifth cave from the west, two male skeletons of the same type were discovered, and several more have been recovered from Cavillon and Baoussou da Torre, in the Mentone group, while far away to the north, at Obercassel, near Bonn, a Magdalenian man has come to light showing the same features.

COMBE CAPELLE TYPE.—Another variety of Upper Palæolithic folk has a very long and high-ridged skull, of which the skeleton discovered at Brünn, the capital of Moravia, some sixty miles north of Vienna, is the best known example. Similar finds have been made at Brûx in Bohemia, and Combe Capelle, near Montferrand, Perigord, in France, and more recently at Prědměst. This was a shorter race, standing about 5 feet 3 inches, with deep-set eyes, projecting cheek bones, prominent brows, broad noses, projecting upper jaws, and narrower faces than the Crô-Magnons (Fig. XV.). This type also seems to have survived in the Dordogne and North Spain.

GRIMALDI TYPE.—A third sub-group of these early modern men are represented by the much-discussed "Negroid" skeletons of an old woman and a youth found during the excavations by the Prince of Monaco at Grimaldi in the Grotte des Enfants, and now resting in the interesting little archæological museum at Monaco. This cave had been a hyæna den till it was occupied (apparently only for a short time) by the Mousterians. The grave in which the "Negroids" were buried was in the Mousterian deposit, but it appears to have been dug from the overlying Aurignacian floor. It is therefore generally thought that the skeletons were interred there at the very beginning of the Upper Palæolithic. But they are certainly not at all like the other human remains found in Aurignacian sites. The lower jaw projects and the chin recedes, as in the Neanderthal

FIG. XV.—COMBE CAPELLE SKULL.

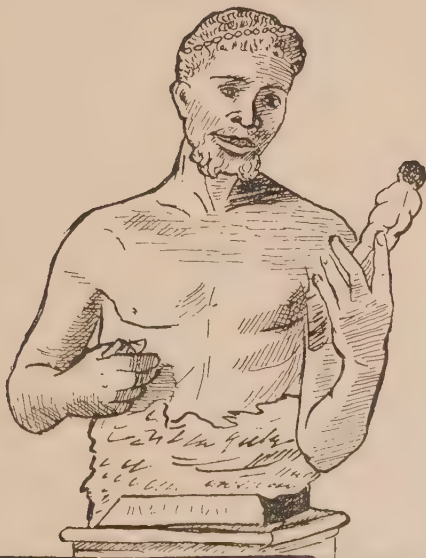
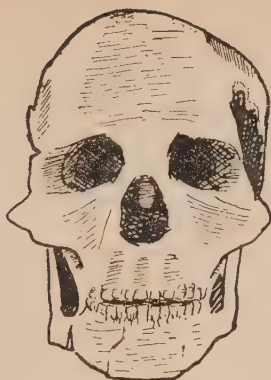


FIG. XVI.—A MODEL OF THE GRIMALDI SKELETON.
(Restored by M. Mascré, under the direction of Professor Rutot.)

skulls but to a less marked degree, the teeth are large and protruding, the nose is flat, the lower limbs are long as compared with the upper limbs, while the height of the woman was only about 5 feet 2 inches, and that of the young man 5 feet (Fig. XVI.). Although some experts are inclined to regard these individuals merely as variations of the Crô-Magnons, their characteristic features seem to relate them to types that have become specialized as Negroids in Africa. It may be that a few negroes made their way into Europe from Africa at the close of the Würm glaciation, and established themselves on the Mediterranean coast, but so long as the two lonely examples from Grimaldi remain the only representatives of the race in Palæolithic Europe, it is impossible to say what relation they bear to the rest of the Aurignacian population.

STATUETTES.—In favour of the theory of a negroid race inhabiting Europe at this time, the existence of peculiar female figures in Aurignacian sites is sometimes quoted. Thus in the caves adjacent to the Grotte des Enfants at Mentone, statuettes of women have been found showing a curious enlargement of the buttocks, known to scientists as "steatopygy" (Fig. XVII.). This is a characteristic feature of the Bushmen of South Africa, and it is suggested that the Aurignacian sculptors who modelled these figures were an African race, represented today by the Bushmen and Hottentots, but in the Old Stone Age spread over the south of France, the north of Spain, and reaching perhaps to Austria, where similar statues have been discovered. Moreover, the figurine of a fat woman carved out of limestone, known as the "Venus of Willendorf," which was found in 1908 in an ancient river deposit near the railway halt of Willendorf (Austria), about sixty miles from Vienna, shows the hair as a series of tufts like the "pepper-corn" tufts of the Bushmen. Another "Venus" has just been found at this spot, but the head is unfortunately lacking. It is said to be much slenderer than the dumpy stone statuette, but we must

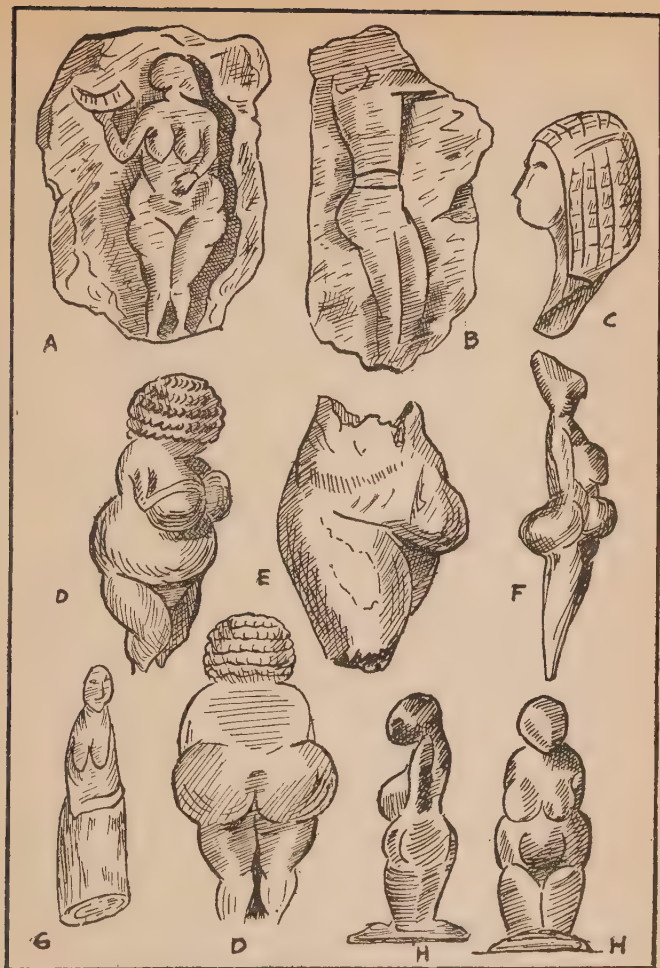


FIG. XVII.—AURIGNACIAN STATUETTES.

A, B. Sculpture of a woman and man from Laussel (after Lalanne).
 C. Head from Brassempouy (after Piette). D. Venus of Willendorf (after Szombathy). E. Venus of Brassempouy (after Piette). F. Statuettes from Barma Grande, Mentone (after Piette). G. Bust carved from tooth of horse (after Dupont). H. Statuette from Grimaldi (after Reinach).

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await the report of the discoverer, Dr. Bayer of the Naturhistorische Museum, Vienna, for further details. Another figure of the slimmer type has also been announced, but not yet published, from Unter Wisternitz in Moravia.

These figures, however, clearly are not intended to be portraits, and there is no reason to suppose from their skeletons that the Aurignacian women in any way resembled the grotesque images. On the contrary, the majority of the remains belong to the tall, well-built Crô-Magnon type, while the Grimaldi skeletons do not indicate abnormal features. Even if most of the burials known to us are those of males, it is not usual to find a race where all the women are fat and the men thin. If they are not likenesses, what, then, was the purpose of these statuettes? Are they just primitive attempts at sculpture, or have they some deeper meaning?

Since similar figures with the maternal organs grossly emphasized have been found in Crete, Malta, Egypt, the Ægean, and Western Asia, and known to have been used in connection with the worship of the Great Mother goddess, it would seem probable that the Aurignacian statuettes represent an earlier phase of the same belief. The two great interests of primitive people everywhere, and at all times, are food and children. As Sir James Frazer says: "To live and to cause to live, to eat food and to beget children, these were the primary wants of man in the past, and they will be the primary wants of man in the future, so long as the world lasts." The "push of life" from within and the struggle for existence from without, directed the religious impulse to the adoption of magical devices to make man and beast fruitful and multiply, and these Aurignacian figurines probably represent the earliest life-giving amulets; the prototypes of the Mother Goddess of fertility and birth whose cult became so popular in later times.

THE LAUSSEL RELIEFS.—This conclusion is supported by a remarkable sculpture in relief found by

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Dr. Lalanne in a large rock shelter at Laussel on the Beune near Les Eyzies, with four other reliefs and a complete set of sculptor's tools. This overhanging cliff was inhabited first in Acheulean times; it was visited by the Mousterians, and then again in the middle or at the end of the Aurignacian. It was among the remains of this last occupation that the bas-relief occurred, showing the figure of a woman holding the horn of a bison in her right hand (*cf.* Fig. XVII.). The block of limestone is about 18 inches in length, and there are traces of red colouring matter here and there on the carefully modelled and polished figure. Unfortunately, the head is left as a blank. On another relief found near this figure, a man is represented wearing a girdle and in the act of throwing a spear, or possibly drawing a bow, but the head and arms are badly damaged. It has been said that the female figure is Negroid in appearance, but, as it seemed to the present writer when he examined these reliefs at the house of Mme. Lalanne at Bordeaux in 1925, the resemblance is not very apparent. More obvious is the skill with which the designs were executed and in the case of the one with the remains of red on the reliefs, it seems to be a typical fertility figure.

RED SYMBOLISM.—Red symbolism is everywhere connected with the primitive notion of blood as the life, the vitalizing fluid that kept man and beast alive, and brought about death when it went out of the body. Being a hunter, Aurignacian man would observe that when an animal or a man was wounded he became faint from loss of blood, and ultimately lost consciousness and died. Blood, therefore, must be the vehicle of consciousness and life, and just as its escape produced death, so life could be restored by applying the red vitalizing fluid to the corpse. But from Aurignacian times onwards, as Professor Elliot Smith has shown, it seems that substitutes for blood were endowed with a similar potency. This explains the custom we have observed at Paviland, and which

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recurred at Mentone, of burying the dead with red ochre and in red-stained earth. Thus revived, the sleeper would awake with renewed strength. Moreover, certain shells appear to have been regarded as also having life-giving properties, and probably for this reason the Paviland and Mentone skeletons were adorned with a necklace of shell amulets in addition to having been buried in red earth.

MOTHER GODDESS.—Primitive people always imagine that objects which resemble each other have similar properties and powers. We distinguish between a portrait and the person represented, but the untrained mind thinks that somehow they are both parts of the same individual, and therefore if you act upon one you produce a like result in the other. This way of reasoning is known as "imitative magic," because a real act is supposed to result from an imitative act. Shells like the cowrie may have suggested the idea of maternity for obvious reasons, while the figure of a woman with her characteristic features unduly emphasized would naturally become a symbol of fertility (motherhood) and life-giving power, as she is the mother of the human race. To paint such an object red would increase its vitalizing qualities, and render it a very powerful amulet, causing animals to multiply and the desert to blossom as the rose. This seems to be the most satisfactory explanation of the female grotesque figurines and reliefs found in Upper Palæolithic sites, and if shells were also thought to impart vitality, their frequent occurrence in the later part of the Old Stone Age was for a similar purpose. There are traces of these early beliefs, not only in the classical myths of the goddess Aphrodite (Venus), but also in our own folk-lore, where shells frequently figure as love charms, to say nothing of the nursery rhyme which describes "Mary, Mary, quite contrarie" having in her garden "cockle-shells all in a row."

CAVE DESIGNS.—It may be, as Piette suggested, that sculpture was the first of the arts to appear, and then

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followed the bas-reliefs and figures of animals in outline, but since all these occur also in the later Magdalenian deposits, very likely they all developed about the same time. The Aurignacian designs, however, are rougher than those of the later period, and contain a larger proportion of sculpture. It is now nearly fifty years ago that cave art was first discovered by the five-year-old daughter of the Marquis de Sautuola, a Spanish nobleman of Santander, who in 1879 was excavating the well-known cave of Altamira on the Spanish side of the Pyrenees, near the village of Santillana del Mar. The little girl having become wearied of watching her father digging in the floor of the low cavern, wandered about with her candle. Looking up at the ceiling she caught sight of some coloured paintings of what she supposed to be bulls, and suddenly called out "Toros! Toros!" (bulls). Imagine the astonishment of her father, when on coming to the spot where she was standing, he saw above their heads polychrome designs not of "bulls," in the modern sense of the word, but of Palæolithic bison! (Frontispiece). Scientists are inclined to be conservative and chary of accepting evidence until it is verified. It is hardly surprising, therefore, that the authenticity of this remarkable discovery was questioned till other similar finds were made in caves belonging to the Old Stone Age. Fifteen years later the true significance of the Altamira bison was established when M. Rivière came upon engravings and paintings in the cave of La Mouthe, situated about two miles from Les Eyzies in the Dordogne. Moreover, it was now clear that the Aurignacians as well as the Magdalenians decorated their caves, for La Mouthe had been occupied in the earlier phase of the Upper Palæolithic.

AURIGNACIAN ART.—Since *La Mouthe* represents one of the most ancient prehistoric "art galleries," it forms a convenient site at which to begin a study of this interesting phase of Palæolithic culture. Setting out from Les Eyzies (Fig. XVIII.), we pass through the picturesque village overhung by limestone rocks, and

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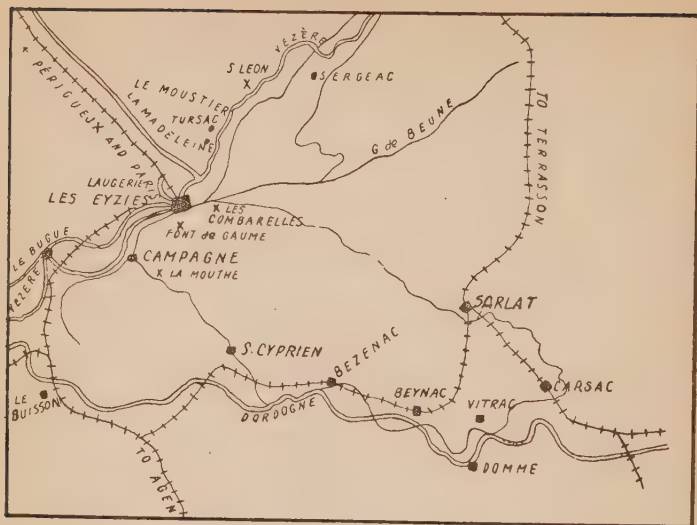


FIG. XVIII.—LES EYZIES.

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cross first the Vézère and then the Beune at the point where this river joins the main stream. Taking the Sarlat road to the left, a huge protruding rock comes into view having the sinister designation, "Le rocher de la Peine," because in Feudal times offenders were thrown from it to their final resting-place. Leaving this road to the left, a steep path up the hill-side brings us, after about half an hour's sharp walking, to a farm where the key of the cave can be obtained. The entrance to La Mouthe is off the path to the left a few yards down the cliff, but when M. Rivière began to dig there, the entrance was blocked up by a deposit containing Magdalenian flints. This showed that the cavern had been closed since the end of the Old Stone Age. Within is a narrow, winding passage with engravings of the mammoth, horse, reindeer and bison along the walls, and curious markings facing the entrance. Although the designs are not as spectacular as those at Altamira, they are quite well done, and they have all the romance of a pioneer discovery which led the Abbé Breuil and other archæologists to search for further decorated caves with such conspicuous success.

In France, so far as we know at present, they are chiefly situated in the Dordogne, mainly around Les Eyzies, in Corrèze, and in the Pyrenees, especially in the department of Ariège. On the other side of the mountains, they recur in Cantabria in North Spain, in the province of Burgos, and the limestone ridges in the south, stretching from Malaga to Ronda. In Eastern and South-Eastern Spain, a different style of paintings is found under overhanging rocks in shallow shelters, which some think belongs to a later period, while in Southern Italy one decorated cave has come to light, though, again, its relation to the French and North Spanish series is difficult to determine.

Now, although practically all these paintings and engravings have much in common, they are by no means identical in all cases. The earliest examples are simply outline drawings badly proportioned and lacking

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in detail. The animal is generally depicted in profile, having only two legs, but the horns are represented as if viewed from the front (Fig. XIX.). The head is too small for the body, and the hind parts are omitted. Nevertheless, they show vigour and powers of observation, the faults being those of an apt child learning to draw. The earliest engravings are little more than heavy, wavy, and parallel lines, made perhaps with the fingers or some forked instrument, without any definite meaning, so far as can be determined today, though to the original artist they had probably a very real significance. Some look like marks left by bears sharpening their claws on the walls of the cave, and it is possible that they were reproduced to give this effect. Imprints of human hands, which had been laid on the walls and then smeared round with colouring matter, occur in the Aurignacian shelters. Since left hands predominate, it has been conjectured that the earliest modern men were right-handed, because, it is supposed, they threw the coloured powder with this hand to stencil out the design.

GARGAS.—To discover the meaning of these various decorations, we cannot do better than pay a visit to a cave where they can be examined in their original setting. A few miles from Montréjeau, in Haute Garonne, on the French side of the Pyrenees, between Toulouse and Lourdes, lies the village of Aventignan, near St. Bertrand-de-Comminges, the ancient city of the Convenæ, and the home of one of the most interesting cathedrals in Southern France. The river Neste runs through this charming valley, on the north side of which is a range of limestone hills with moraines, and débris of the Ice Age. A spur of these hills projects into the Garonne valley, and near the top of this is a cave known as Gargas, which, according to tradition, was inhabited by a brigand until comparatively recent times. The very stone may be seen, in fact, on which he sacrificed human beings whom he decoyed into his refuge! Let the would-be archæologist take care when he goes forth on

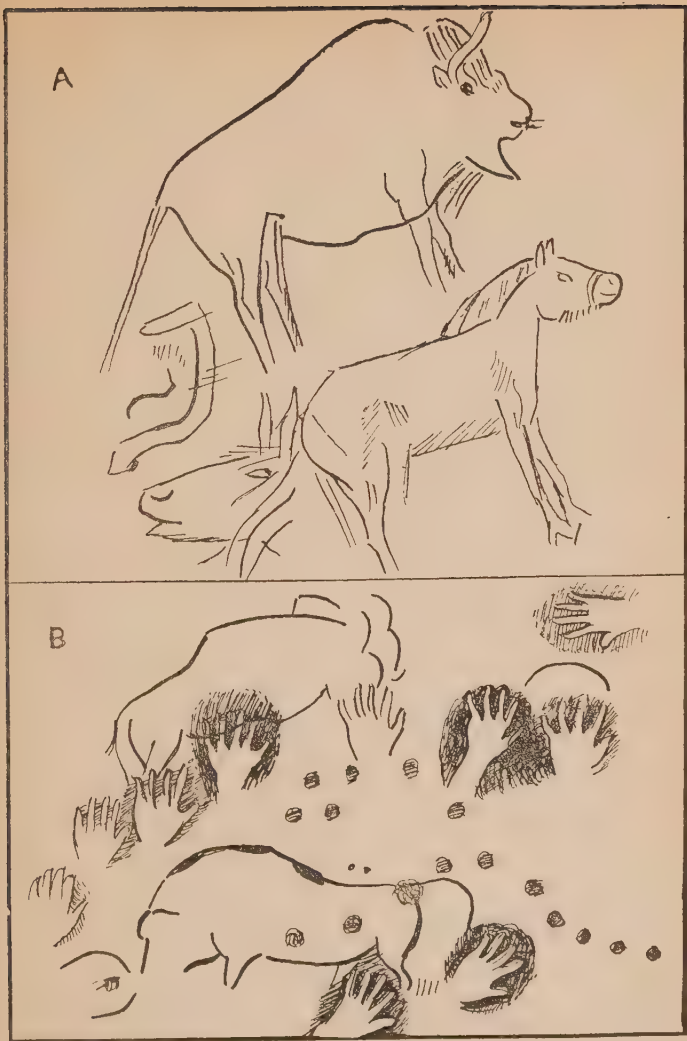


FIG. XIX.—AURIGNACIAN DRAWINGS.

A. Engravings from Hornos de la Peña (after Breuil).

B. Silhouetted hands from Cave of Castillo, Spain (after Breuil).

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cave exploration. We are not told what was the ultimate end of the ruffian, but it may be surmised that he perished miserably from rheumatism and pneumonia (as doubtless he well deserved), if he continued to inhabit the cavern for any length of time; for when the author visited Gargas one hot day in May, the heavy rain which had fallen two days before was steadily percolating through the porous limestone, with the result that one stood ankle-deep in water in many places. His first conclusion, therefore, was that the Aurignacians are not very likely to have made this "art gallery" a permanent place of abode. On looking round, this obvious deduction was confirmed by the observance of the remains of a hearth near the entrance, where were still visible the relics of a refuse heap and a few fragments of flint. Formerly Aurignacian implements have been found here. Clearly the original community lived at the mouth of the shelter.

The main cave was apparently closed up at the end of the Aurignacian occupation by a fall of rock, and therefore it was never entered by the later (Magdalenian) Palæolithic folk who have left a few frescoes on the walls of the smaller outer chamber. On penetrating the inner cavern one sees only the earliest attempts at decoration, consisting of forty-six stencilled hands, eighteen in red and twenty-eight in black pigment, together with primitive drawings, engravings, and nondescript markings. In the case of the hands, the proportion of left to right is very much larger on the left wall than on the right, and in many of them one or more fingers are missing. The inference is that the joints had been cut off for some magical or religious reason. The practice of finger mutilation is known among the Australians, Bushmen, and Red Indian tribes as a blood-offering in times of sickness, disease, and as a mourning rite after a death. In Morocco and elsewhere representations of hands are used as charms against the Evil Eye, the hand acting as a screen from the dangerous look. Thus, the Moors hang figures of

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an open hand from the necks of their children, and stretch out the five fingers of the right hand towards a person who is suspected of having an evil eye, saying, "Five in your eye," or "Five on your eye." We cannot, of course, be sure exactly what motive the Aurignacians had in making the silhouettes in their caves, but probably they attached some kind of a magical significance to them.

The same conclusion may be drawn from the strange markings resembling bear scratchings on the walls of the inner chamber at Gargas. This animal was doubtless regarded as having supernatural power by reason of its great strength, some of which would cling to its claw-marks, just as it resided in its teeth, which consequently were worn as amulets. To reproduce the scratchings would be a means of assimilating this mystic force analogous to the carrying of a charm containing it.

Turning to the drawings and engravings, it is often difficult to make out what animals they are supposed to represent, because they have been designed one on top of the other despite the fact that there is plenty of wall space available. In some cases only the head is depicted. Now this is understandable if the designs were made for purposes of magic, but not so if they are regarded as works of art, for while the first attempts at drawing would naturally display the mistakes common among children at this stage, yet a child does not usually draw half a dozen pictures one above the other on the same piece of paper. But this is more apparent in the later caves like Altamira, where there is an excellent figure of a bison minus its head; and in the magnificent polychrome paintings at Font de Gaume in the Dordogne, spoilt by having been covered by a second figure.

Again, it is hardly likely that Palæolithic artists had acquired the virtue of self-effacement to the extent of choosing the most obscure nooks and crannies of the darkest and most inaccessible caverns for the pursuit of

their art; yet it is in such places that the pictures invariably occur. As we have seen, Gargas is not exactly an ideal spot for a portrait gallery, with its dripping roof and vertical pits here and there making its exploration a somewhat precarious undertaking for the unwary even with a powerful acetylene lamp. But compared with some of the decorated caves, this is a very simple shelter to explore, as anyone will admit who crosses the Pyrenees and pays a visit to the two very large and intricate caverns situated in the limestone mountains behind the delightful Cantabrian village of Puente Viesgo, an inland watering-place between Santander and Burgos. The first of these is named *Castillo*, which has the distinction of having been visited by the Queen of Spain, while a little farther on, facing up the valley, is the second, called *Pasiega*. Both of them are so complicated that it is essential to secure the services of a competent guide before attempting to explore them, *Pasiega* being especially difficult.

PASIEGA.—The explorer begins his adventures at *Pasiega* by sliding down a wall 6 feet deep, and then, scrambling along a low winding passage, arrives at a low chamber from which passages branch off in various directions. To the left, reached by a rather perilous gallery, lies a little chamber, at the end of which is a stone seat, partly natural and partly artificial. On this, when the first explorers entered, they found a limestone disc-like human implement, and dirty finger-marks on the arm of the chair. If, instead of going to the left, a right-hand option had been taken, the explorer would find after a time paintings appearing on the walls and roof of the gallery. At the extreme end there is a narrow fissure filled with tectiform or roof-shaped designs, such as are found in many other caves, and supposed by some people to represent huts or tents. This part of the cavern was formerly reached by an ancient entrance now nearly blocked, near which is a sort of painted inscription—perhaps a tabu sign.

The cave was in no sense a habitation, yet early man

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must have gone there fairly often, for it contains over 250 paintings and 36 engravings of deer, horses, bison, stag, ibex, and chamois, chiefly coloured in red, besides other markings. It is unthinkable that he would have continued to frequent this perilous and inaccessible labyrinth in the heart of the mountains from Aurignacian times to the end of the Magdalenian, unless he had some very important reason for doing so. "Art for art's sake" would not have lured him into these dark and treacherous paths, difficult enough for us moderns to traverse with our powerful lights, but incredibly more so when only flickering lamps were available. What, then, was it that led him thither?

TUC D'AUDOUBERT.—To find the answer to this question, let us return to the French side of the Pyrenees and make our way to Ariège. The railway line from Bayonne runs parallel to the snow-capped hills, passing Pau, the fashionable Spa, and Lourdes, where, beside a Palæolithic cave, another grotto may be seen from the carriage window, which attracts thither more than half a million pilgrims annually; a small junction is reached named BousSENS, whence a branch line leads to the little market town of St. Girons in Ariège. If time permitted we might alight from the very slow train at Salies-du-Salat, the first station on this branch, to visit the interesting cave of Marsoulas, where paintings occur in a long narrow passage, so small that they can only be reached by crawling and wriggling oneself along in the most undignified manner. But we must press on to St. Girons, for in the foot-hills of the Pyrenees, near the town, two remarkable caverns have been found which throw very much light on our present problem. The first of these, called Tuc d'Audoubert, can only be entered by taking a boat and rowing up the river Volp, which here issues from underground, and then scrambling up into a large chamber containing magnificent stalactites hanging from the roof. In a corner of this room there is a narrow passage containing Magdalenian engravings of

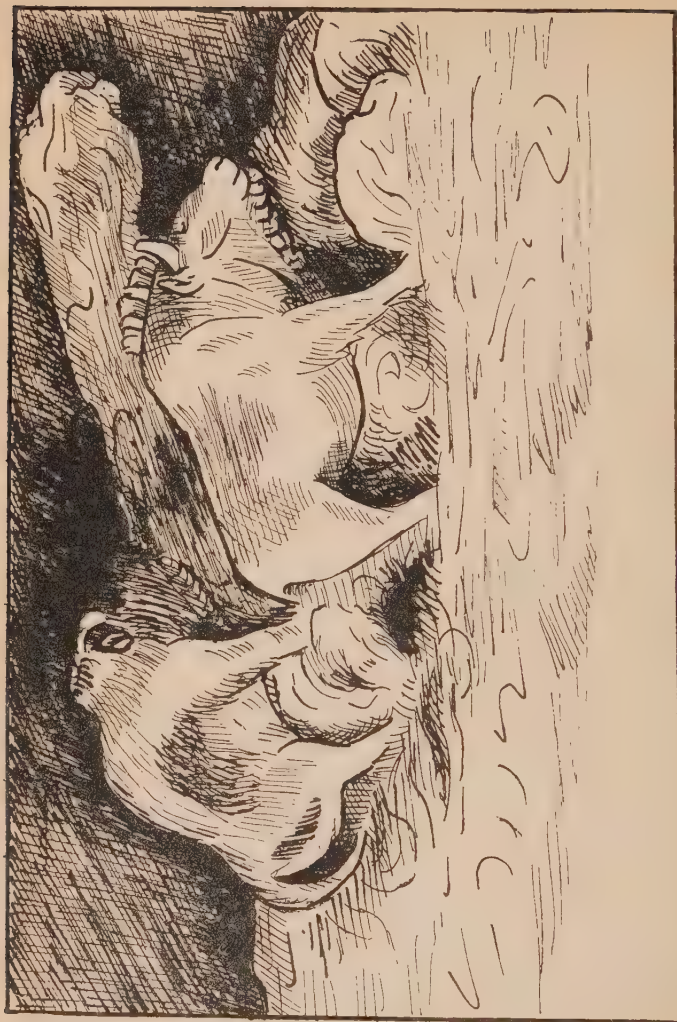


FIG. XX.—CLAY MODELS OF BISON FROM TUC D'AUDOUBERT (from *L'Anthropologie*, vol. xxiii.).

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the horse, bison, and reindeer, and traces of paintings, and this leads to a more remote chamber with more engravings thought to belong to the earlier phase. It was into this sombre recess that the two sons of Professor Bégouën, Max and Louis, and a companion, François Camel, penetrated in October, 1912, being probably the first persons to enter the chamber after it was blocked up by a landslide or the accumulation of débris in Palæolithic times. Having hacked their way through stalactite pillars and other obstacles, they were richly rewarded, for not only did the gallery contain wall carvings, but also the marks of the naked feet of the original hunters who resorted there, while in an inner sanctuary there were carefully modelled statues of a male and female bison in clay, 24 inches long, leaning up against a boulder; two other models lying close by on the floor (Fig. XX.). Near by, around a small hillock of clay, there are marks which are thought to have been made by human heels during a dance.

This is not the only indication that Palæolithic man danced out his religion, for dancing figures wearing animal masks are represented in the cave paintings at Abri Mège in the Dordogne. A man-like figure with a horse's head has been found in a Magdalenian site at Lourdes, while near Tuc d'Audoubert, in a recently discovered cave called the *Trois Frères* (Three Brothers), a curious drawing has come to light. In a small alcove at the end of a long passage, amid an array of engravings of all kinds of Pleistocene animals, there is a strange design, partly engraved and partly painted, having the body of a man in profile, clothed in the skin of an animal, the head hidden under a mask with a long beard and great antlers, and the back ending in a horse's tail. This terrifying object is represented in the attitude of a hunter creeping along with bent knees seeking his prey (Fig. XXI.). In front of it is a sort of balcony at the end of the passage, and Mr. Burkitt thinks that here an audience assembled to witness



FIG. XXI.—MASKED FIGURE (THE "SORCERER"), FROM TROIS FRÈRES, ARIÈGE.

(Copied from photograph by Count Bégouën.)

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some form of ceremonial ritual, while M. Max Bégouën, who has been inspired to write a romance around his observations in the inner chamber at Tuc d'Audoubert (the English translation of which has just appeared under the title *Bison of Clay*), regards the strange image as the portrait of the Great Spirit of the chase, protector of the clan.

Less than twenty miles from Tuc d'Audoubert and Trois Frères, the daring exploit of M. Castéret in August, 1923, brought to light a cave at Montespan containing more figures in clay. To reach the entrance he swam in the icy water of a subterranean stream flowing through the cavern for the distance of nearly a mile, passing even through the neck of a siphon under water, clad only in bathing attire, and carrying a candle and matches in a rubber case. In one place the ceiling was so low as to be completely under water. On entering the chamber his prowess was rewarded by the discovery of over twenty clay models of horses like the Tuc d'Audoubert bison, and the figure of a large headless bear, $3\frac{1}{2}$ feet long and 2 feet high, holding the skull of a young bear between its paws, raised on a platform in the centre of the cave. Against the walls, which are decorated with engravings, were three larger models, 5 feet long, thought to be lionesses, and a model of a horse's head, while part of the body of a woman lay on a clay hillock. On the floor the design of a horse showed thrusts in its neck, and marks made by spears were visible on the neck and chest of the bear, and on the breast of one of the lionesses (?).

NIAUX.—Figures of wounded animals having darts and arrows indicated upon them in vital spots are common in the decorated caves. Thus, in the famous cavern of Niaux, three miles from Tarascon in the Ariège, 300 feet above a small tributary called the Vic de Sos, and about thirty miles south-east of Tuc d'Audoubert, in the great hall more than half a mile from the entrance, are black paintings of bison with arrows in their sides, together with designs of the horse, ibex,

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stag and reindeer. This great hall has been likened by Dr. Marett to the interior of a cathedral with side chapels, "such as a mediæval artist might have seen in dreams, aerial, carven, and shining white." In the right-hand corner on the ground are representations of two fish not unlike trout, and near by, under a ledge of rock, may be seen the footprint of one of the Magdalenian artists, protected by stalagmite like some of the paintings, thereby removing all possible doubt concerning its antiquity. Apart from a small lake near the entrance, and a narrow opening between rocks before the chamber is reached, this cave does not call for any athletic feats, following as it does a straight course into the mountain—the ancient bed of a subterranean river fed by melting glaciers, but now much drier than many caves we have visited. Some distance along this lofty passage the road divides, the path to the right containing three small hollows on the ground under an overhanging wall round which a bison has been engraved, so that the three cups are made to indicate wounds with little arrows annexed. Near the cross-roads is a curious design of a wounded bison, the rock composing the back of the animal. A red spot near the heart portrays the wound, and in front of the expiring animal there are circles and club-shaped markings (Fig. XXII.).

MAGICAL PICTURES.—Such paintings as these clearly must have been made to bring success to the chase by imitative magic, the effigies having been mutilated in the belief that by so doing the animal depicted would fall under the power of the hunter by reason of the spell that had been cast upon it. If the natural markings on the walls of a sacred cave could be utilized in making the design, so much the better, for the spot would doubtless be regarded as especially sacrosanct. This is seen at Niaux, where the natural crevices in the rock served for wounds, and the custom of making drawings one on top of the other was probably due to the belief that a particular place was propitious, however inaccessible it might be. Similarly, since blood is

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DYING BISON DESIGN FROM NIAUX (after Breuil).



FIG. XXII.—NIAUX : ENTRANCE TO THE CAVE.

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the life, its magic virtue is more potent than that of any other substance. Therefore if the designs were painted with it they would be more efficacious; but red ochre was the next best thing, and it had the advantage of being more durable. As this would render the spell more lasting, it would be generally preferred, no doubt, as a medium, which probably explains the numerous red paintings found in decorated caves.

FONT DE GAUME.—This is well illustrated at the great cave of Font de Gaume, just outside Les Eyzies, on the left of the Sarlat road. Here the polychrome paintings occur (often one above the other) beyond the point where the corridor narrows to form what is called the Rubicon, while one of the most interesting is in an inner sanctuary, now closed by a gate. This consists of a remarkable painting of a rhinoceros in red, high up on the left wall, with other designs below to within a few feet of the ground, thereby showing that the floor level at this point has not altered since the paintings were first made. Now no artist for æsthetic reasons would have climbed an almost vertical wall, to the height of 10 feet, to execute a fresco which can now only just be seen by the aid of skilfully arranged electric lighting, and which must have been quite invisible by the light of flickering lamps. Clearly this was a sacred spot, and therefore it had to be utilized at all costs, just as the excellent creations in other parts of the cave were sacrificed to magical requirements, one design after another being drawn at the same place because it happened to be the propitious spot. It would seem, then, that the first artists were really magicians or medicine-men. ,

THE ART OF THE ARTISTS.—This, however, is not to deny that the Palæolithic painter or sculptor was devoid of the artistic sense. On the contrary, it is evident from his work that he had both the æsthetic genius and a very high degree of skill in its expression. The present writer has had the advantage of visiting most of the decorated caves in Western Europe in the com-

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pany of one thoroughly competent to pass judgment on the artistic value of the paintings, but even to the plain man without this specialized knowledge—the mere scientist, for instance—it is apparent that many of the Magdalenian designs reach a high order of artistic consciousness. A work of art is the embodiment of mind, of the inner spirit of man, dependent in some degree at least on the mastery by the artist of the technique and media of representation. At Font de Gaume there are no less than eighty magnificent reproductions of animals in various attitudes, painted in polychrome, showing artistic appreciation, while at Altamira the lifelike and vigorous figures of bison on the roof of the cave must have been drawn by men lying on their backs, like Michael Angelo painting the Sistine chapel. Though utility undoubtedly came before beauty, such men must have found æsthetic delight in their work. As we have seen at Gargas, any figure suffices for the purposes of magic, but the Magdalenians, alike in the paintings and engravings, maintained correct proportions, and even made attempts at perspective (Fig. XXIII.), while the effect of movement was sometimes conveyed perhaps by increasing the number of the legs of a running animal, unless the additional legs were painted at different periods, as is not improbable. A wild boar having eight legs, on the roof at Altamira, however, does give the impression of speed. Realism probably came to be regarded as of magical value at this time, but the skill with which this result was achieved shows a remarkable grasp of fundamental principles, and the fact that in the Magdalenian period many of the designs were engraved on pieces of bone and reindeer antler, adds considerably to the difficulty of the work and reveals the mastery of the worker over his material. We venture to think, therefore, that the title of this chapter is justified.

THE SOLUTREAN INDUSTRY.—Palæolithic art, however, was not confined to paintings and sculpture, for at the end of the Aurignacian culture phase a wonderful

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flint industry appeared in Europe in certain districts, which gave a new direction to the expression of the artistic sense. Who it was who introduced this new culture it is difficult to say. There is no evidence either of a sudden change in climate at the close of the Aurignacian, as the mammoth and bison still survived; nor

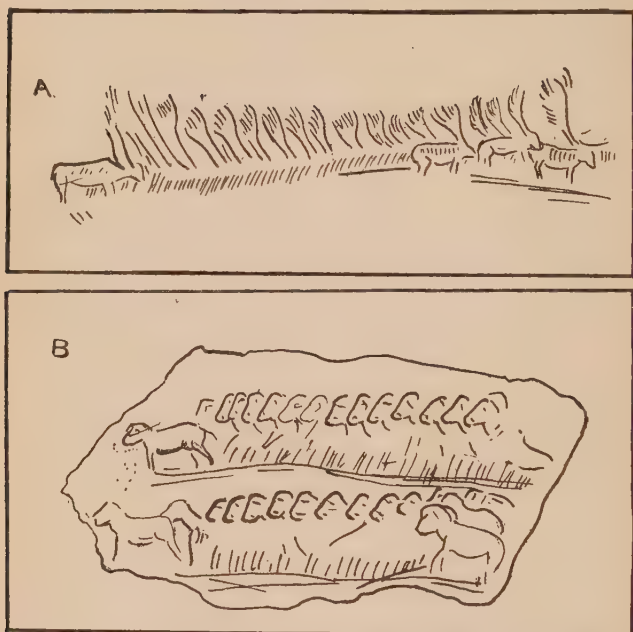


FIG. XXIII.—PERSPECTIVE DRAWINGS OF HERD OF REINDEER (A) AND HORSES (B) (after Cartailhac).

are there any indications of a great war having taken place at this time. Yet the Aurignacians suddenly disappeared, and a new migration spread over the plains of Central Europe in pursuit of wild horses and cattle to France and the Northern Spanish coast, finally returning to the East whence they came. The earliest traces of these people occur in Hungary, whence they seem to have

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made their way westwards up the Danube valley. Some ethnologists think that the skulls found at Brünn and Brûx in Czechoslovakia represent the remains of this race, but in that case the Combe Capelle skeleton in the French Aurignacian is a little difficult to explain. But as excavations proceed we shall doubtless learn much more about these interesting broad-headed folk, and a full account of the skulls recently found at Předměstí (Moravia) and Solutré (France), which we are still awaiting, may throw some new light on the problem. In the meantime we can only speak with certainty of the handicraft, which derives its name, *Solutrean*, from a large open-air encampment near the French village of Solutré in Saône-et-Loire, although Laugerie Haute, just outside Les Eyzies, is in some respects a more typical deposit.

The characteristic feature of this culture is the use of pressure flaking in the making of very thin flint implements shaped like a laurel or willow leaf. The degree of skill exhibited in the production of these blades is comparable only to that of Egypt when it was at the height of its flint industry (Fig. XXIV.). The surface of the blade was reduced by pressure, probably with bone tools, as among the American Indians today, and flaking was then commenced by pressure, and shaped with artistic skill and originality. At first only one side was delicately flaked, but in the latest or upper Solutrean deposits, triangular blades appear having a tang or shoulder, usually on the right side of the triangle when the convex face is uppermost (*cf.* Fig. XXIV.B). This implement is known to the French as *pointe à cran*. From the edge of the blade to the middle, long, thin, parallel flakes usually run, either on one side, or on both faces. Flakes with a double edge worked into a scraper at the edge opposite to the bulb, borers, and double-ended scrapers, as well as minute flakes, also occur in this period.

VOTIVE OFFERINGS.—Fourteen of the exquisite laurel-leaf spear-heads found at Volgu in the commune

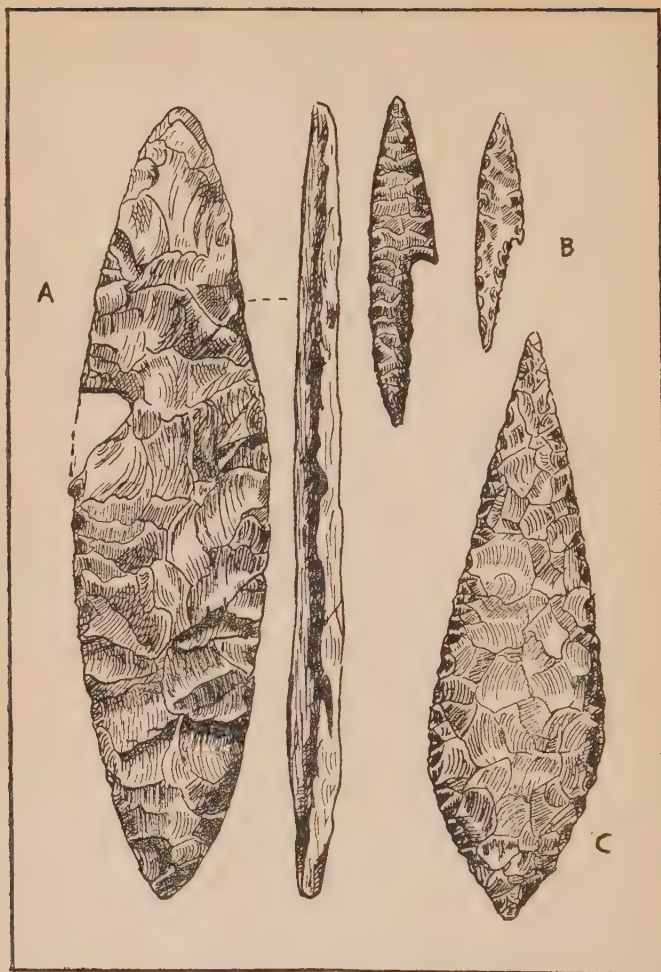


FIG. XXIV.—SOLUTREAN IMPLEMENTS.

A. Leaf blade (after Reid Moir). B. Shouldered points (after de Mortillet). C. Leaf blade (after de Mortillet).

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of Rigny, Saône-et-Loire, ranging in length from 9 to 13 inches, 2 to 3½ inches in breadth, and 0·2 to 0·4 inch (6 to 9 mm.) in thickness, are thought to have been used for religious purposes. They are far too fragile for weapons or tools, and the fact that traces of red colouring matter has been found on one, supports this conjecture. Mr. Donald Mackenzie has made the interesting suggestion that the Solutreans may have had a "flint-god"—an early form of Zeus or of Thor, whose earliest hammer was of flint—just as the Aurignacians had a goddess cult. This is by no means an unreasonable suggestion, since in Minoan Crete the double axe was a symbol of a deity, and the Romans revered "Jupiter Lapis," while in the religion of Ancient Egypt stone images play a prominent part, and flint knives occur as votive offerings.

But whatever their precise use and significance may have been, it is undeniable that they constitute another example of the artistic genius of *Homo sapiens* in the Old Stone Age. The remarkable symmetry of the flaking and the elegance of the design reveal not only perfection of workmanship, but also a subconscious realization of beauty of form. Their technique was quite distinct from the Aurignacian, and they seem to have concentrated on flint work to the exclusion of all other artistic expression. True, graphite and ochre have been found in their hearths, but no trace of Solutrean painting has yet come to light, while examples of engraving on ivory and bone which could be assigned to this period are confined to the statuette of a mammoth sculptured in relief on ivory from Prědmot, and a few carvings of animals found in 1925 at Bourdeilles, near Brantome, Dordogne.

MAGDALENIAN INDUSTRY.—Similarly, with the sudden disappearance of the Solutreans after their short reign in Central Europe, flint working declined as rapidly as it had risen to perfection under the new influence. The Aurignacian type of culture at once prevailed again, cave painting and sculpture taking the place of flint

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flaking. Breuil thinks that the Magdalenian stage may have originated in the French Pyrenees as a more or less direct development of the Aurignacian still persisting there, while the Solutrean wave passed northwards. This would account for the absence of Solutrean remains in the French Pyrenees except in two sites in Haute Garonne (Grotte des Harpons and Gourdan). To this subject, however, we shall return in the next chapter. One thing is quite certain, the Magdalenian method of flint working was absolutely distinct from that of the Solutrean, the beautiful leaf-shaped implements being replaced by long ribbon-like flakes struck off from a core by a single blow (and sometimes curved with a concave inner surface), but without secondary chipping of the edges (Fig. XXV.). Graving tools such as the *burin*, together with borers, double-end scrapers with little secondary chipping, are typical of the period, and working in bone and horn made great strides. Needles, fish-hooks, harpoons and other weapons for throwing occur, such as darts headed with points cut from reindeer antlers, or made of long shafts of wood fitted with thin blades of flint, or pointed with pieces of reindeer horn. A loose cord made of sinews was probably attached to the point of these throwing weapons and fastened to the staff held in the hand, so that when the animal was struck it could be brought to a halt at once, and thus prevented from being lost in the undergrowth. No doubt the engravings on javelin shafts had a magical significance, it being supposed that the strength or other characteristics of the animals depicted would be communicated to the man who used them. The so-called *bâtons de commandement* which have been found in large numbers in Magdalenian sites may have been employed as arrow-straighteners, if indeed the bow and arrow was known in the Palæolithic, as similar decorated objects are used for this purpose among the Eskimo. But at present we have no conclusive evidence of archery in the Old Stone Age.

The remains of Magdalenian art and industry are

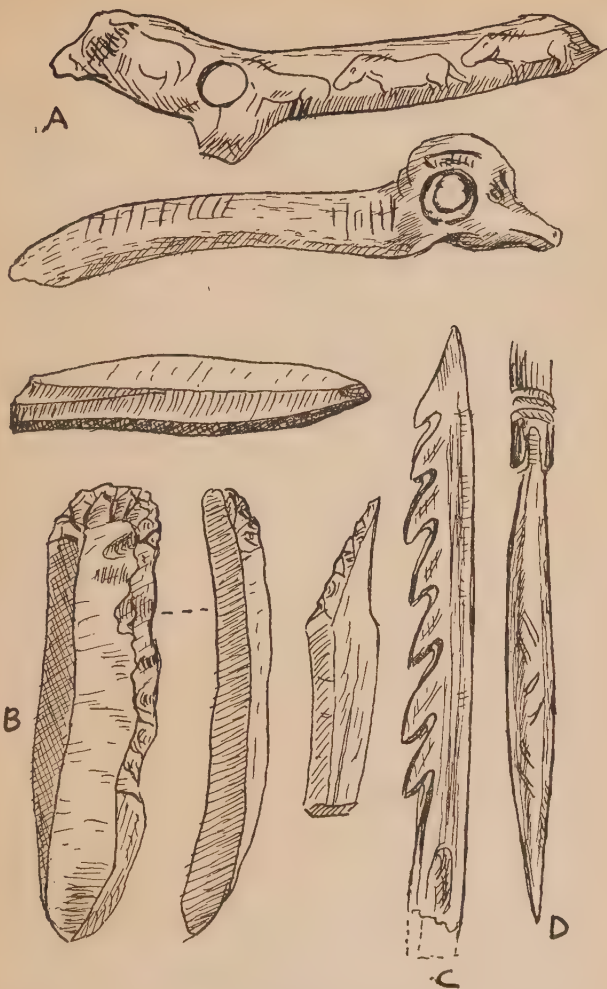


FIG. XXV.—THE MAGDALENIAN INDUSTRY.

A. *Bâtons de Commandement* (after Breuil). B. Flints (after Breuil).
 C. Harpoon. D. Bone javelin point.

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bewildering in the variety of their manifold forms, and indicate a very high degree of culture. The climate, which had become distinctly warmer during the Achen interglacial stage, contemporaneous with the Aurignacian and the Solutrean periods, assumed semi-glacial conditions again at the beginning of the Magdalenian (Bühl glaciation). The reindeer and the horse are the most prominent animals in this culture, though the antelope, musk ox, arctic fox, and lemming appear in a lesser degree, while the mammoth and woolly rhinoceros occur in the earlier part of the epoch. In the warmer days the Magdalenian hunters were doubtless busy setting their traps, and devising new methods of securing their prey by tying branches from a bough to act as a noose for smaller beasts, placing weighted poles ready to fall on the first thing that passed, arranging and digging pits filled with wooden stakes carefully concealed on the trails of the larger animals. Leaving these to do their deadly work of their own accord, the men set out in search of game, and thus, when all went well, their larders were replenished against the approach of winter, when the food supply was scarce, and ravenous wolves made short work of anything caught in the traps, and, if in sufficient numbers, of the hunter himself should he be alone on the prairie. Probably it was in these strenuous winter days that man came to resort more and more to magical means to control the food supply, and seek supernatural aid in the struggle for existence. When hunting was impossible and the traps empty, he would doubtless repair to the inner recesses of the cavern sanctuaries, while the shaman-artist drew living representations of the animals he so much desired to encounter in the flesh, and held sacred dances to make them fruitful and multiply and once again replenish the earth.

At length, towards the end of the period, perhaps about 7000 B.C., the final retreat of the ice began, and, except for a temporary relapse into arctic conditions during the so-called *Gschnitz* and *Daun* advances, the climate

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reached more or less its present mean annual level and oak forests covered the open plains. This, however, was not to the liking of the Magdalenians, who followed the reindeer northwards from their Palæolithic haunts in France. Professor Sollas thinks that they travelled to Siberia, where they became the forerunners of the Eskimos; but while there is a similarity in culture between the two "reindeer peoples," and the Magdalenian skeleton found at Chancelade in the Dordogne reveals certain physical affinities with the Eskimo, yet there are serious geographical and other difficulties involved in accepting this very attractive theory. But wherever they went when they left France, they do not appear to have made a permanent habitation in England, and this probably accounts for the absence of cave art in these islands. Although the Magdalenian artists penetrated to the southern slopes of the Pyrenees, and may have even begun their career there, about 10000 B.C., after the first Bühl advance, yet they belonged essentially to France, and especially to Ariège and the Dordogne.

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CHAPTER V

THE COMING OF THE CULTIVATORS

WITH the final retreat of the ice the Old Stone Age drew to a close. How many years it occupied in the vast scheme of evolution it is impossible to say, but however it is estimated—and the last word on this subject must rest with the geologists—the end of the Magdalenian brings human history within measurable limits in terms of years. True, a precise date for this event acceptable to everybody cannot be fixed at the moment, but the tendency among experts now is greatly to reduce the former estimate. Thus, M. Reinach has recently suggested 5000 B.C. as a possible date, but as he bases his conclusions on objects found at Glozel, near Vichy, which are almost certainly forgeries—Breuil having definitely stated, at any rate, that the engravings are not Magdalenian—they cannot be regarded as very trustworthy. From the geological evidence derived from the land movements which produced the Ancylus lake (*cf.* p. 155), and opened a wide channel from this lake to the North Sea, the following chronological sequence for the transitional cultures to be discussed in this chapter is suggested :

<i>Date.</i>	<i>Baltic.</i>	<i>France.</i>	<i>Scotland, Alps, and Pyrenees.</i>	<i>Portugal and Spain.</i>
B.C. 7000 (Bühl) ...	—	Magdalenian	—	Late Caspian
6000	Magle- mosean	Early Azilian	Early Azilian	Late Caspian
5000 (Gschnitz)	Magle- mosean	Late Azilian and Tardenoisian	Tarden- oisian	Mugem
4000-3000 ...	Shell mounds	Campignian (?)	—	Asturian

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CAPSIAN CULTURE.—At the end of the Palæolithic important changes in the flora and fauna of Europe took place, and it was at this time that the English Channel river, as well as the Baltic and Mediterranean Seas were formed. With these new conditions came fresh movements of people having different habits of life and ideas; while in place of the Palæolithic animals, which had retreated to the north, or become extinct, new specimens appeared. In North Africa a flint culture, similar to the Aurignacian in Europe, arose at an early period. This is called *Capsian*, because Gafsa (Latin, *Capsa*) in Tunis is a typical site of the industry, and from this centre it spread into Spain and Italy in the Old Stone Age, as well as along the North African coast. It took the place of the Solutrean and Magdalenian, the implements being a mixture of early and late Aurignacian types, and towards the end of the period they diminished in size till they became so tiny that they resembled the microlithic or “pygmy” industry of the transitional phase called the “Tardenoisean,” of which more will be said in a moment. Properly speaking, this culture belongs to the last chapter, but its relation to the Tardenoisean-Azilian culture in Europe has led us to reserve this new element in the Upper Palæolithic for discussion at this point.

The Capsians learnt to use the dog for domestic purposes instead of hunting it, and probably they decorated their rock-shelters with paintings which differ in many respects from those of the Magdalenians, resembling more the pictures found in the Bushmen caves. Some of them are very skilfully drawn, representing life-like hunting scenes. The human figures are designed in silhouette, frequently crudely conventionalized, assuming strange and warlike attitudes, and often holding bows and arrows (Fig. XXVI.). The women are clad usually in wide skirts of crinoline type, but the men are unclothed. These paintings, which may be seen in Eastern Spain—for example, at Cogul and

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DANCING FIGURES AT COGUL (after Breuil).



ALPERA FIGURES.

COGUL PAINTINGS (after J. Cabré).

FIG. XXVI.—SPANISH ROCK PAINTINGS.

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Alpera—occur under overhanging rocks in shallow shelters, instead of in the deep recesses of mountain caverns. They are thought by some to be later than those of the French Magdalenian caves, and to be the work of the Capsian folk, though at present this has not been proved. The presence of a bison at Cogul, and an elk and a chamois in a design near Alpera, shows, however, that they were executed before the end of the Palæolithic, when these animals became extinct. Professor Keith is convinced that the Bushmen evolved in South Africa from a Mousterian ancestor, contemporaneous with the European Aurignacian age, and spread northwards. If the Eastern Spanish paintings belong to the Palæolithic Capsian period, this might account for them and explain their resemblance to the art of the modern Bushmen. But at present we cannot be at all certain about this culture, for Mr. Burkitt regards it as “the late development of the civilization of a people who migrated south under the influence of the oncoming Neolithic invaders until they finally arrived in South Africa.”

Leaving on one side the vexed question of the Bushmen, it seems tolerably certain that the Capsian represents a North African Aurignacian flint industry, whence developed a transitional or *mesolithic*¹ culture with pygmy tools similar to, if not identical with, the Tardenoisean of Europe, since their implements included minute flakes beautifully finished by secondary chipping, used probably as the teeth of saws. True, these pygmy flints have a very wide distribution, extending through Egypt and Syria to India; yet, so far as Europe is concerned, they apparently represent a definite industry which entered the continent from Africa at the end of the Old Stone Age, and spread through Central

¹ The transitional cultures lying between the Palæolithic and Neolithic periods are sometimes called *mesolithic*, while other writers refer to them under the name *epipalæolithic*. In the older books they are often referred to loosely as Azilian, but this term is only applicable to one of them.

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and Eastern Spain, across the Pyrenees into France, where it encountered another culture at Mas d'Azil.

AZILIAN CULTURE.—Between Foix and St. Girons in Ariège, the river Arise flows for a quarter of a mile through a great limestone tunnel, and on the left bank, near the spot where the stream enters the hills, a cave called *Mas d'Azil* occurs in which Piette excavated nine different deposits. On the surface, Iron Age pottery and Roman pins were found; below this came a Bronze Age stratum, and so on, till at the bottom Magdalenian flints occurred associated with remains of the reindeer, bone harpoons and needles. It was in the fourth horizon from the top, in a layer of red loam, that a transitional culture was recognized consisting of small round scrapers, flint blades, pebbles used as chisels, harpoons and other implements of stag's horn, curious pebbles with designs painted on them, and a human burial in red ochre. The implements are of a very inferior nature, while the horn objects contain no trace of engraving except a few meaningless lines scratched on a piece of stone from Sordes (Fig. XXVII.). It is the painted pebbles that have excited the greatest interest among archæologists in this collection, and all kinds of explanations have been given to account for them. Piette, who discovered no less than two hundred of them at Mas d'Azil, thought they represented the beginnings of a system of calculation and writing, while others have likened them to the sacred stones called *churinga* or bull-roarers of the central tribes of Australia. But more recently they have been compared with the conventional figures in the Capsian rock paintings in Spain, which in their turn have been brought into relation with similar drawings scratched on rocks in Libya and ancient Egypt, and it now appears that they may be fantastic forms of the human figure and other realistic designs. In this case, probably they represent the last stages in the degeneration of Capsian art, surviving perhaps as amulets for some magical purpose.

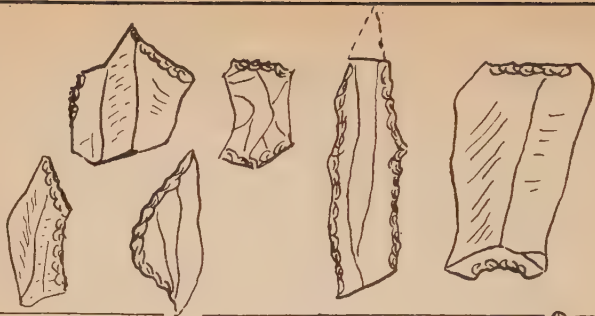


FIG. XXVII.—AZILIAN PEBBLES AND HARPOONS.
A. Harpoons. B. Painted Pebbles (after Piette).

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AZILIAN-TARDENOISEAN CULTURE.—The *Azilian* culture as revealed at Mas d'Azil seems to have been confined to restricted areas, chiefly in the South of France and North Spain. Nearly a dozen pebbles not unlike those described above have been recorded from Keiss in Caithness, but both Breuil and Burkitt are agreed that they have no connection with the Azilian examples, although bone harpoons belonging to this culture have been found near Oban and in several places in England. It also recurs near Liège in Belgium, in Eastern France, and south of Bâle. The animals in these sites being of a modern, warmth-loving type, which include the dog, suggest that the culture was subsequent to the Magdalenian, though it was inferior to it in its art and industries. This conclusion is borne out by the position of the stratum in which its remains were first found at Mas d'Azil, the type station. In a cave called Valle, near Gibaja, between Bilbao and Santander in the North of Spain, the presence of Azilian tools associated with those of the Tardenoisean type, shows that these two cultures must have existed at the same time. The *Tardenoisean* is, as we have seen, a pygmy industry which derives its name from its type station at an ancient French castle called Fère-en-Tardenois in the province of Aisne. The deposits belonging to this industry differ from those of the Azilian phase in that they usually are found on or near the surface, and, except at a few sites in Belgium, not in the mouth of caves above Palæolithic remains. The implements, too, are very much more skilfully made, as well as very much smaller, being composed entirely of microlithic or pygmy flints (Fig. XXVIII.). Some think this method of tool-making was introduced by the Capsians during their migration in a northerly direction. But it is not confined to this Capsian area or to one transitional period. Nevertheless, it seems to have been intimately connected with the Azilian, and therefore the two cultures are generally grouped together under the title

A



B

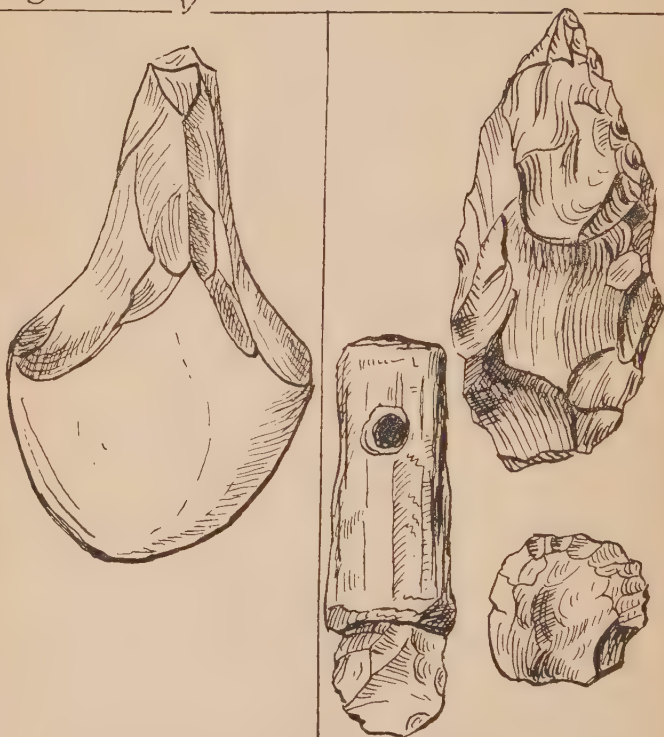


FIG. XXVIII.—TRANSITIONAL INDUSTRIES.

A. Tardenoisean flints. B. Asturian pick. C. Maglemosean tools.

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"Azilian-Tardenoisean," both perhaps being modifications of an earlier Capsian culture. The Azilian is the smaller culture of the two, however, and it has been described as an island floating in the "Tardenoisean sea," though how it made its way to Great Britain is a puzzle.

Bearing these somewhat technical considerations in mind, let us revisit the Grottes des Enfants near Mentone, and see if we can unravel the mystery of this early transitional period. Here, as we have seen, the Aurignacians made their habitation, or at any rate buried their dead, but there is no indication of either a Solutrean or Magdalenian occupation, despite the fact that the upper deposits must have been laid down during the Bühl glaciation, since they contain reindeer bones. At the top of these beds, however, an Azilian-Tardenoisean industry occurs, with pygmy tools and round scrapers, the earlier Aurignacian scrapers becoming tinier and tinier, until in the upper levels they are microlithic. It would therefore seem that the Azilian-Tardenoisean culture has developed from the Aurignacian, and consequently the Azilians would appear to be related to the original Aurignacian invaders of Europe, rather than descendants of the Magdalenians. Hence the absence of Magdalenian painting and bone work in Azilian sites, and the return to châtelperron-points and other Aurignacian forms in the flint work. The Azilian industry has not yet been found south of the Pyrenees, and it is not improbable that it represents an amalgamation of late Capsian culture from Spain combined with the remnants of the Magdalenian as indicated by the Azilian bone harpoons. Later this culture complex may have been overlaid by a Tardenoisean migration. Mentone would be a likely place for these streams to meet.

OFNET.—During this transition from Aurignacian to mesolithic conditions, the Azilian-Tardenoisean folk doubtless underwent changes in their appearance as well as in their culture, but they remained a long-headed people with a longer shaped face than the Palæolithic

Crô-Magnons. About this time the first representatives of the round-headed, thick-set Alpine race began to appear in Western Europe. Thus at Ofnet, in Bavaria, in a cave containing evidences of occupation from early Aurignacian times onwards, above the Magdalenian deposits is an Azilian layer in which were two pits, each filled with skulls grouped together like eggs in a nest. The larger of these contained no less than twenty-seven skulls, the smaller six, all being embedded in red ochre. Those of the women were ornamented with shells, teeth, and pygmy flints, and there are signs of the heads having been cut off the rest of the body after death, and preserved ceremonially in this sacred ossuary, with the face looking to the west, the region of the setting sun. All this shows that the Azilians had a very definite and developed belief about life after death, but it is not this that concerns us especially at the moment. When the skulls are examined, it is seen that while the majority are long-headed some are round-headed, suggesting that two types or races existed at this time in Bavaria. Similarly, in a cave at Furfooz, in the valley of the Lesse, Belgium, a Tardenoisean burial of round-headed skulls has been discovered, together with Magdalenian flints and implements of reindeer horn. These sites suggest that an advance guard of round-headed Neolithic folk made their way westwards along the north of the Alps at an early period, and reached Belgium while the Magdalenians were retreating with the reindeer and the ice. That round-heads existed as far westwards as Portugal in mesolithic times is shown by the presence of two crania of this type in a late Tardenoisean burial in the marshy valley of Mugem, near the Tagus.

MAGLEMOSEAN CULTURE.—While the Azilians and Tardenoiseans moved about in the south, a transitional culture was developing in Denmark and Southern Scandinavia, with a few isolated stations in Finland, Northern Germany, and as far south as Boulogne, and as west as the Yorkshire coast. But it is on the island of Zealand (Denmark), in the *Maglemose* or

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great bog of Mullerup on the west, and at Svaerdborg in the south, that the remains of this culture are most conspicuous. A good deal of land movement occurred in Scandinavia at the end of the Palæolithic. When the ice first retreated, the Baltic became a wide channel open at both ends and known as the Yoldia Sea. Scandinavia was an island until after the last glaciation, when the land arose, making the Baltic a land-locked freshwater lake, named after a little mussel living in its waters, the *Ancylus*. It was at this time, when birch and pine trees flourished, that the so-called *Maglemosean* culture prevailed in the Baltic region.

What the people were like in appearance we do not know, as no remains of their bodies, except two bones of a child, have been found, but apparently they lived on the banks of lakes, or on floating rafts in the shallow water. These lakes have now silted up into a bog or maglemose, composed of shelly mud and sand, not unlike some of the Irish bogs, overlaid with peat, and in this way the remains of the original "lake-dwellers" have been preserved. Their tools consisted of flint scrapers, pygmy flakes, bone harpoons of the Azilian type, fish-hooks, bone chisels, pierced antler hafts and axes (Fig. XXVIII.C). No traces of pottery or the reindeer have come to light, the animals represented being all modern species like the stag, the roedeer, moose and wild ox, but apart from the dog no domestic breeds have been found. Polished stone implements are also absent in these sites.

While stray Palæolithic hunters may have roamed about in Denmark and Scandinavia, which, perhaps, accounts for the hafts made of reindeer bone recorded from the Baltic area, the Maglemoseans undoubtedly represent the earliest settled inhabitants in this district. Apparently they came from Eastern and Central Europe, being the last of a Palæolithic group driven to the north-west by the new invaders. So very transitional is their culture, that they are difficult to place

in the absence of skeletal remains. They must have formed considerable settlements, however, as nearly nine hundred implements have been recovered from the peat at Mullerup. If they erected villages as artificial islands on the lakes, as is indicated by the position of the objects found in the deposits, no signs of the wooden piles or of any of the buildings have been discovered as yet. If they lived on floating rafts this is understandable, as the wood is hardly likely to have been preserved under these conditions.

SHELL MOUNDS.—After the final dispersal of the ice, the east coast of Scandinavia sank again so that the Ancylus lake became the Baltic Sea, and the newly-formed gulf swarmed with fish. The periwinkle, or *Littorina*, which predominated, has given its name to the culture phase which prevailed at this time—the date of which is generally thought to be either 6000-4000, or 4000-3000 B.C. It is characterized by the huge piles of oyster and other shells that sprang up along the coast, over a yard high, and covering an area of 100 yards by 50 yards. These were the dust-bins of the people, and they are sometimes known as “kitchen middens,” from the Danish *køkkenmøddinger*, but this term is not altogether appropriate because actually they arose around the dwellings. These mounds may have been the work of the earliest Neolithic inhabitants of Denmark, since coarse pottery made from crude paste has been found in them, but apart from this the culture gives every appearance of being transitional. Thus there is no evidence of domestic animals besides the dog, or of agriculture in this culture except at Limhamn in Southern Sweden. The tools are of flint, bone, and staghorn, the axes are hafted in pieces of antler, and a few harpoons occur, as in the Maglemosean sites, but no pygmy tools. Some of the objects are decorated with fine engraved lines, but no representations of animals have been found. The presence of the black cock in the heaps shows that pine-trees were abundant, as this animal fed chiefly on

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the pine; but it was during the damp and warmer days of the *Littorina* period that the oak made its appearance. Hunting and fishing were undoubtedly the main occupations of the people who lived among the shell mounds, and the culture gives the appearance of being rather an adaptation of the Maglemosean than the beginning of a new mode of life. Further inland on the shores of fresh-water lakes, or on their islands, there are similar remains; while shell mounds also occur in many parts of the world, as, for example, along the north-west coast of America and in Vancouver Island, among people living in a kind of transitional stage between hunting and agriculture.

ASTURIAN CULTURE.—In the eastern half of the Cantabrian province of *Asturias* or Oviedo, in Northern Spain, quantities of shells—limpets, cockles, whelks, mussels, oysters, sea-urchins, and snails—have recently been recognized in front of caves in which a struggling community seem to have eked out a miserable existence along the coasts of the Bay of Biscay. In these heaps the Count de la Vega del Sella has found a new type of pick, made from an oval river pebble, used apparently for removing shell-fish from the rocks (Fig. XXVIII.B). For the rest the industry at this site is not very interesting, consisting merely of some round pebbles, a few borers, and coarse pottery in the later stages of the culture. The *Trochus*, a warmth-loving mollusc, is the most typical shell in the deposits, but there is no trace of the periwinkle (*Littorina*), although it is common in this district today. This suggests that the climate then was warmer than it is now, as the periwinkle prefers the colder water of the Atlantic to those of the more temperate Mediterranean, whereas the *Trochus* occurs in both. The Asturian animals consist of the stag, the roedeer, horse, weasel, wolf, badger, hare, and pig. No human remains have been found, but the fact that the Asturian deposits always succeed the Azilian show that we are dealing with a later culture analogous to that of the Danish shell mounds. Exactly what, if

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any, relation exists between them it is impossible to say, but the occurrence of these similar remains in North Spain makes it highly improbable that the Scandinavian mounds represent the spontaneous beginnings of the Neolithic civilization. It seems much more likely that both are the remnant of a degenerate transitional culture, there being no evidence of originality in either case.

CAMPIGNIAN CULTURE.—Another of these intermediate stages that is very difficult to place is that which derives its name from a hill near the town of Blangy-sur-Bresle, in the Department of the Seine-Inférieure, called *Le Campigny*. The site consists of the remains of pit-dwellings hollowed out of gravel containing mammoth bones, and covered by about 8 inches of surface earth, in which a jumble of prehistoric objects of all dates have been found. In the pits, according to M. Capitan, unpolished flint hatchets and picks, similar to those at Maglemose, were found at the bottom in yellow loamy soil above the cinders of a hearth, and associated with scrapers, knives, and pottery. In the charcoal below were implements and potsherds of the same type, while on the top was a layer of earth containing polished Neolithic stone tools. This sequence, of course, suggests that we have here a separate transitional culture midway between the remains of the Old and New Stone Ages; but M. de Morgan claims to have found a polished stone axe-head, clearly a Neolithic implement, in one of the pits, and other archæologists are not satisfied with the methods adopted at the original excavation. The author has not visited Campigny himself, and therefore he is not in a position to pass judgment on the station; but the pick and the so-called Campignian axe are certainly not proof of a distinct culture. While they are not unlike those found in the Danish shell mounds, similar types occur in the Neolithic settlements at Spiennes and St. Gertrude in Belgium with the same kind of decorated pottery discovered in this site,

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Koztowski connecting it with Poland, Russia and Syria. But until the vexed question of the stratification is cleared up, the precise dating of the Campignian pits and their contents is hardly possible, and the cautious observer will suspend judgment for the time being.

It would seem from the evidence here summarized, that at the disappearance of the ice a series of new cultures were introduced into Europe by groups of migrating hunting peoples, who carried on in the main the old traditions, though in a modified form. Exactly how far they were influenced by the earliest representatives of the Neolithic invaders it is difficult to determine, but, at any rate, the basis of the cultures apparently was definitely Palæolithic. Probably communities of Crô-Magnons and the allied racial types survived the last glaciation, and these may have mingled with the dark Iberians who carried the Azilian culture into France and elsewhere. That these transitional people had succeeded in domesticating the dog is certain; but there is no clear evidence at present that they cultivated flocks and herds, practised agriculture, or had discovered the process of polishing stone tools. Their art was inferior to that of the Magdalenians, and, except in the case of the Maglemoseans, no very serious attempts at engraving seem to have been made. As the oak forests increased hunting became difficult, and the people were reduced to eking out a precarious livelihood on shell-fish and such vegetable food as could be collected. But widespread degeneration so often ushers in a new era, and the transitional phase between the Old and the New Stone Age seems to have been no exception to this rule.

THE NEW STONE AGE.—With the establishment of the Neolithic invaders all this was completely changed, and new ideas were manifest wherever the new races penetrated. In the west, however, the process was more gradual than in the east and south, possibly because there a communication of ideas rather than a migration of peoples is reflected in



FIG. XXIX.—NEOLITHIC IMPLEMENTS.

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the cultural advances, except along the coastlands. Be this as it may, the advent of new knowledge produced a marked advance on the former achievements all over the continent. The most notable innovations were the practice of agriculture, the domestication of animals, pottery-making, the use of polished and ground-stone implements (Fig. XXIX.), and, closely associated with these customs, stone tombs and graves under earth mounds appeared, together with settlements containing groups of dwellings, earthworks, navigation, mining, textile manufacture, the use of the wheel, and other arts and crafts. But in this chapter we shall confine our attention to the two fundamental discoveries on which, as it seems to us, the new civilization was based.

DOMESTICATION OF ANIMALS.—Although Mr. Reginald Smith, of the British Museum, thinks that the remains of species resembling short-horned cattle, sheep and pigs in the Upper Palæolithic deposits indicates that certain animals may have been used for domestic purposes in the Old Stone Age, most authorities are agreed that cattle-raising, like agriculture, first came into vogue in the Neolithic period. It is hardly likely that very young animals and the females would be killed, as the Palæolithic cave paintings show was the case, if the secret of taming them for breeding purposes and manual work had been discovered. There is, however, an exception that doubtless proves the rule so far as the Old Stone Age is concerned, in the case of the dog, which was probably the hunter's companion even before the disappearance of the ice, though it was not till the Maglemoseans invaded the north and the Azilian-Tardenoiseans established themselves in the centre and the west that he became the constant ally in human settlements. His new status in the family may have been secured quite accidentally, as Professor Macalister suggests: some half-starved wild cur crawling up to a refuse-heap to search for bones, and, instead of being greeted with a stone, a kindly man, in an after-dinner mood, throwing him another bone. "The grateful beast,

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which has sprung aside with an anticipatory yelp, is taken by surprise at the unexpected favour, and creeps a little closer into the confidence of the encampment. At night some thief or enemy comes to surprise the camp, and the dog rouses the sleepers in time to defend themselves. Thus the use of a watchdog is discovered, and the animal becomes permanently attached to the settlement. After a time he begins to accompany the man who is now his master on hunting expeditions, and there proves himself of further use." This is, of course, just a guess, but it is based on the fact that the remains of the domestic dog have been found in Azilian sites at La Tourasse and Oban, in the Baltic Maglemosean stations, in the Danish shell mounds, and in the Tardenoisean site at Mughem. In Neolithic deposits the earliest dogs are of the small jackal variety, the larger wolf-like animals (used, perhaps, as sheep-dogs) coming on the scene later.

Once it was discovered that animals could be employed for domestic purposes, it was not long before the practice of stock-rearing began. Pumpelly thinks that this was brought about by a long period of drought in the steppes of Western Asia driving the cattle into the better watered oases. Thus it is supposed they came into more intimate contact with man. But this is scarcely true in the case of the mountain sheep and goats, which would be more easily tamed than the larger and more ferocious beasts, and it might be imagined that man would have experimented first on the smaller fry. At a delta-oasis called Anau, near Astrabad, in Turkestan, on the Central Asia Railway, where Pumpelly carried out excavations in ancient mounds which led him to this conclusion, the domesticated breeds appear in a stratum later than that containing wheat and barley. Four cultures occur in these mounds, each new generation building on the ruins of its predecessors, the cultivators of crops coming before the cattle breeders. One of the two kinds of sheep found at Anau was a short-horned

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species, similar to the "Turbary" sheep which were kept by the Neolithic people who lived on the Swiss lakes (*cf.* Chap. VI., p. 171), and the cattle of the oldest settlements are also thought to have come from Central Asia. In Egypt sheep, goats, and short-horned cattle were kept in prehistoric times, M. de Morgan having discovered even the enclosures in which they were penned at night. After the monarchy had been established, about 3400 B.C., dogs were used for hunting and sport, cats for keeping down rodents at each overflow of the Nile, the ass for transport, and the ox for agricultural purposes, while on the Fens geese and ducks were kept. This employment of animals as the servants of man, which played an important part in the development of civilization, was also practised in Mesopotamia and Arabia about this time. Probably it was from the East that the custom was introduced into Europe in the Neolithic period, the horse being one of the later arrivals.

AGRICULTURE.—Even a more revolutionary discovery was the cultivation of crops, the invention of agriculture being virtually the beginning of civilization, since it produced a settled state of society and the assurance of a food supply. But in determining exactly where this momentous event occurred we are at once confronted with a conflict of expert opinion. Elliot Smith has recovered husks of barley (*Hordeum spontaneum*) from the intestines of the desiccated bodies found in an early predynastic cemetery at Naga-ed-Der in Upper Egypt. This cereal may have grown wild in the Nile valley, as it is found in the north-east corner of Africa, and in that case the first settlers may have used it for food when they first established themselves in the land. In process of time they may have imitated the natural processes, and thus have brought it under cultivation. But if barley did grow wild in Egypt at an early period, it is difficult to say when it was first cultivated, as the report of the excavation of the Naga-ed-Der graves has not been published,

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despite the fact that the work was done as long ago as 1901.

But granting barley was a staple article of diet in predynastic Egypt, can it be maintained, as has been suggested, that wheat was not also eaten simply because no traces of it were found in the material in question? Its absence from the intestines of the preserved bodies only proves that the people had not eaten wheat food at their last meals, or if they had, the husks had been previously removed from the grain. In the dynastic period emmer wheat (*Triticum dicoccum*) was in frequent use, often mixed with barley, Petrie having found a carving in wood of an ear of this species in the tomb of Zer, the third king of the First Dynasty, while remains of wheat have also been identified from the predynastic sites at Abydos and elsewhere. It would seem, therefore, that both wheat and barley were grown in Egypt at a very early period.

Mesopotamia is another district in which wheat was grown about the same time that it was cultivated in the Nile valley. Thus, Professor Langdon has recently announced the discovery of the grain in a vase recovered from the site of an old Sumerian house seventeen miles from Kish, and estimated by him to date from about 3500 B.C. This has been identified as rivet (*T. turgidum*) by Professor Percival, but other eminent grain specialists regard it as bread wheat (*T. vulgare*) or club wheat (*T. compactum*). If it should prove to be the former (*T. vulgare*), it will mean that the Sumerians had succeeded in growing the finest kind of bread-making wheat in the fourth millennium, whereas in Egypt this species (which now has almost entirely taken the place of emmer and barley as human food) was unknown till Roman times. It will then appear that in this respect the Sumerians were ahead of the Egyptians. But the last word on this highly complex problem obviously must rest with the botanists.

Both wild barley and wild emmer have a wide distribution in Mesopotamia, Syria, Palestine and else-

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where in Asia, and, according to Professor Cherry, wild wheat also occurs in the islands of Melos and Naxos in the Ægean, as well as in North Africa. Agricultural communities of considerable size grew up at Susa and Anau in Western Asia at an early period, and it seems very likely, as Professor Childe has shown, that agriculture reached Europe from the East by way of the Danube basin, and was developed in the fertile patches of loess cut by the river in Serbia, and on the plains of Moravia and lower Bavaria. Thence it spread down the Elbe and into the Rhine valley, and westwards into France and Belgium, inspiring the Robenhausian culture. With this expansion the Neolithic arts were intimately connected.

AGRICULTURAL IMPLEMENTS.—The practice of agriculture speedily produced its effects on the life of the community. At first, probably, it was found that barley and wheat or other grain were good for food, and then attempts were made to grow it in considerable quantities. But to sow the crops the ground had to be broken up, and for this purpose a digging stick would be used. This perhaps developed into a hoe, which is one of the very oldest agricultural tools. Then some man of keen observation may have noticed that a strong pole sharpened at one end, drawn by a number of men or even by cattle, was much more effective. In this way *the plough* may have been invented, and improvements, such as the formation of a harrow by the addition of planks would soon follow. Ploughs of this kind are still employed in Spain, and they are depicted as drawn by oxen on Bronze Age rock-carvings at Bohuslän in Sweden, and elsewhere (Fig. XXX.). An early form of plough may have consisted of a large stone adze attached to a long pole, and pieces of flint thought to have been used in this way have been found in Egypt and at a Neolithic site in the Forest of Montmorency in Northern France.

The grain having been grown, it had next to be cut. This we know was done with sickles made of a series of flint blades slightly curved, hafted on a wooden handle

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(Fig. XXX.). Professor Petrie has found a wooden sickle of this type in Egypt, and flints evidently employed for this purpose are common in early sites, surviving apparently even after metal was definitely established. When the grain had been cut, the threshing was a simple matter, and then came the grinding into flour. Two small stones, one slightly hollowed out, perhaps with use, and the other more or less round, which acted as a rolling-pin, constitute the earliest quern. Examples of hand-mills of this nature are abundant in practically all Neolithic stations and lake-dwellings in Europe, and, in fact, in every land where remains of this culture survive.

It was not only on implement making, however, that the practice of agriculture made its influence felt. So long as man was a hunter he was compelled to live a nomadic life, wandering from place to place in search of game, but once he turned his attention to the cultivation of the soil, his movements became curtailed. This led to a general settlement on the land in definite communities. When, in the Würm glaciation, Neanderthal man was driven into the caves, family life, as we have seen, was fostered, but not to the same extent as when his Neolithic successors became agriculturists, for a hunting people must of necessity live in small groups, and the men are compelled to be away from home as much as possible to maintain the food supply.

AGRICULTURAL SETTLEMENTS.—It is hardly likely, however, that nomadic folk suddenly would settle down to the humdrum routine of the farm and the village *en bloc*. Probably groups here and there made their abode in the more fertile countries like Egypt and Mesopotamia, the women at first cultivating the "allotment" around the dwelling, with the help of the men when they returned from the chase, very much as today a man works in his garden in his spare time, and in France the women still are extensively employed in the fields. But in the more open and arid districts the chase is a very precarious mode of livelihood. In the

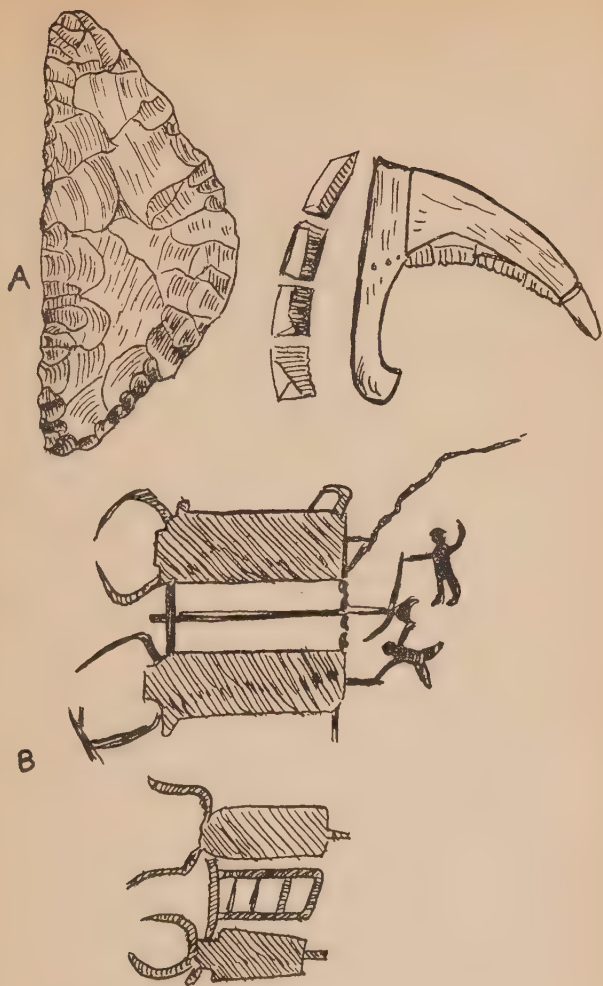


FIG. XXX.—RUDE DRAWING OF PLOUGHING SCENE FROM MONTE BEGO, ITALY (BRONZE AGE).

f Sickle (A) and Plough (B). (From Burkitt, *Our Early Ancestors*, p. 225.)

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warm, dry climate of the later part of the Neolithic period, the great central European forests which flourished in the damp days immediately after the end of the Old Stone Age, opened out into glades and finally became grassy steppes and even deserts, so that it was more and more difficult to subsist on the chase alone in certain districts. Thus by force of circumstances probably the desert tribes were driven to the fertile oases, like the valley of the Nile or Euphrates, in times of drought, for although the Nile floods vary from season to season, there is always sufficient water to make the land cultivable. Moreover, the practice of irrigation was adopted very early in this district to extend the fertile area. The central plains of Asia, again, are another region that doubtless proved to be fruitful, for although it is now arid, formerly it was alluvial, because at the end of the Palæolithic it was covered by a huge lake, of which the Caspian Sea and the adjacent lakes (Aral, Balkash) are the remains.

In such districts large agricultural settlements sprang up, and as the crops became more abundant the population grew rapidly. Domestication of animals probably followed in due course, and food gatherers became food producers. This necessarily led to the erection of permanent dwellings, a fixed mode of life, and an accumulation of wealth. In this way trade was fostered, since the products of the soil are so unevenly distributed that groups would be compelled to exchange surplus goods for necessities. Thus, along the banks of the Nile and the rivers of Mesopotamia, in process of time hamlets and villages tended to become towns and cities, having a regular system of intercommunication, while in the outlying regions, such as Western Europe, encampments were established in favourable spots, on the sides of lakes, on grassy slopes, and in patches on the edge of the forests. From the remains of these settlements we can learn much about the beginnings of civilization, and to this subject we shall devote our next chapter.

COMING OF THE CULTIVATORS

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CHAPTER VI

THE BEGINNINGS OF CIVILIZATION

ONE of the many problems that confronted the earliest cultivators was to find a suitable camping ground, for the soil that lent itself readily to agricultural operations was usually covered with forests, harbouring ferocious beasts and necessitating much labour in clearing away timber. Caves were still employed as homes, but they were only available in limestone districts and certain other places. The banks of rivers proved attractive in countries like Egypt and Mesopotamia, and in Europe a substitute was found in the lakes of Switzerland. Over two hundred villages erected on wooden piles are now known to have existed in this district in Neolithic times, of which fifty were situated on Lake Neuchâtel, forty on Geneva, over forty on Constance, and ten on Zurich, while the smaller lakes also contributed their full quota. Settlements of this kind likewise occurred on the French Alpine lakes, and they extended, in suitable places, from the Jura to Scotland, as well as in Russia, Northern Italy, Austria, and Southern Germany. Some of the stations were inhabited from soon after the close of the Palæolithic till iron had come into general use, the lake-village at Glastonbury being an example of one of these later settlements in pre-Roman Britain. Sometimes two villages of different dates exist side by side, and then usually the Neolithic is the one nearer the shore. In Scotland and Ireland small artificial islands called *crannogs* were constructed in the later periods, while among some primitive people today, as, for instance, in the Philippine and Nicobar Islands and Borneo, dwellings on piles are of common occurrence as a protection against the attacks of man and beast, and to avoid the effects of marsh mists. This mode of

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habitation also survived in historic times in Europe at Ravenna and Venice.

LAKE-DWELLERS.—There were many advantages to be gained from this choice of an abode, inasmuch as it provided a means of communication by water from one village to another, and afforded facilities for fishing. It also obviated sewage and sanitation difficulties, since the refuse could be thrown overboard—a custom that has proved a great boon to archæologists, who, by disinterring the remains from the mud and peat at the bottom of prehistoric lakes, are enabled to reconstruct the life of the people. Moreover, settlements of this nature were comparatively easily constructed, all that was required being a suitable spot on the side of a shallow lake, where the shore shelved off gradually, and a quantity of poles, sharpened at one end, from 15 to 30 feet in length, and 3 to 9 inches in diameter. These were obtained from the trees of the neighbouring forests on the mainland, which were felled with a stone axe, and the poles then set up in the selected spot. Of course this entailed considerable labour in a large village like that at Robenhausen on Lake Pfäffikon, near Lausanne, in which over a hundred thousand poles were employed. A simpler method was that of piling up a series of waterlogged rafts one above the other till a solid platform was formed, resting on the bed of the lake and cemented together with mud and stones. Being exposed to the full force of the water surrounding it, this construction was less durable, however, than the more laborious pile edifice. Above the surface of the lake cross-beams or logs were laid, covered with mud, gravel, or bark, constituting the floor on which the dwellings were built. A long bridge connected the village with the mainland, which could easily be destroyed in the case of an emergency (Fig. XXXI.). Sometimes, as for instance at Lake Varese in North Italy, the settlements seem to have been islands entirely separated from the shore, and therefore the use of a *boat* was essential in order to reach them. But even

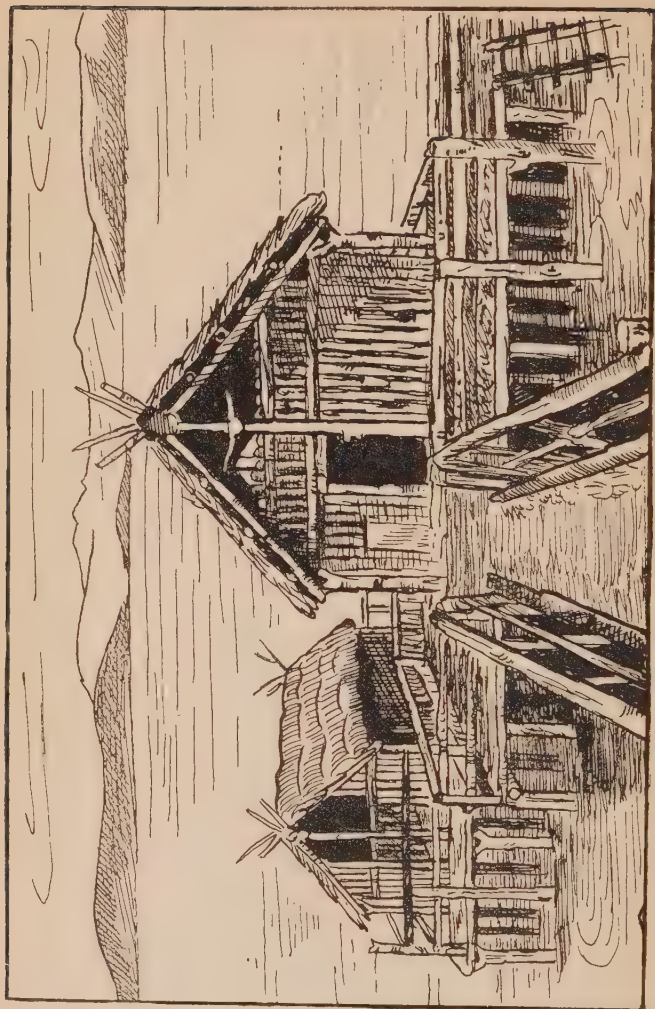


FIG. XXXI.—NEOLITHIC LAKE-DWELLINGS ON LAKE CONSTANCE.
(Adapted from R. R. Schmidt.)

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where the more usual bridge existed, a raft of some kind would be necessary in the construction of the dwellings.

BOATS.—This is not mere surmise, for boats actually used by the Lake-dwellers have been found in the remains of the settlements. Thus at Lake Bienné, a “dug-out” nearly 50 feet long and 5 feet wide has been brought to light belonging to the Neolithic period, apparently made by hollowing the trunk of a large oak. In the museum at Lons-le-Saunier in France, there is a fine oak canoe, 30 feet in length, from a Neolithic dwelling on the Lake of Chalain in the Jura. In Australia today solid logs are used as canoes, and in many countries rafts were made at an early period by tying together two trees. In Scotland a dug-out plugged with cork has been found on a raised beach, and it seems to have reached its destination before the Neolithic industry was introduced, when Scotland was slowly rising to its present land-level.

It would be comparatively a simple matter to scoop out a log with a stone adze, and thus make a place for the primitive navigator and his cargo, and incidentally at the same time lightening his craft and therefore increasing its buoyancy. On the Euphrates, rafts of pitched basket-work were made buoyant by means of inflated skins, and on the calm waters of the Nile, surrounded by a treeless shore, the canoes made of bundles of papyrus reeds tied together, gave place to more substantial vessels in wood, to which were added a deck house, when the Egyptians were able to obtain timber from Lebanon. These may be seen portrayed in the paintings of the ancient tombs, rock-designs, palettes, and funerary vases belonging to the predynastic period, going back in some instances perhaps to 4000 or 5000 B.C. These were connected with the cult of the dead, but they suggest that navigation in this district was well advanced soon after the Old Stone Age, and we know from the records that Egyptian ships were trading in the Mediterranean, as far as Syria, and in the Red Sea certainly in the IIIrd Dynasty (about

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2900 B.C.). The earliest picture of a seagoing vessel occurs, however, in the tomb of the king Sahure of the Vth Dynasty (2600 B.C.), and from the documents it appears that at this time Egyptian ships sailed down the Red Sea to Punt, but they may have been doing so for centuries before this.

In view of this early development of the art of navigation in the Eastern Mediterranean, it is not surprising that in Central and Western Europe boats came into use after the destruction of the land bridges at the end of the Old Stone Age, and the construction of Lake-villages and river-side settlements doubtless stimulated transport by water. When the population in one group of dwellings became too thick, fresh villages had to be erected further along the shore, or on one of the rivers flowing from the Alpine lakes. Movements, in fact, can be traced along the valleys of the Danube and beyond into the rivers of the North German plain and the peat-mosses of Denmark; along the course of the Rhine, and over Northern France, Belgium, and the British Isles. Such migrations would naturally lead to a system of intercommunication in which the water-ways could hardly fail to be used.

From the study of the peat and moss below the Lake-villages, four distinct cultures can be determined, indicating racial movements. First came the people who tilled the fertile banks of the Danube, and whose short-horned cattle and turbary sheep found pasture on the grassy steppes and in the forest glades. They also made excellent slate-grey pottery, shaped like a cup or basin without a handle, and decorated with shallow spiral incisions (Fig. XXXII.), and small, baked, female clay figures. Their tools consisted of a sort of polished stone hoe, called a "shoe-last celt" (Fig. XXXII.), and a heavy "hammer-axe" pierced with a hole for a haft, and having a ground surface. These are agricultural implements, and they were doubtless used in cultivating their barley, wheat, millet and flax, the absence of weapons suggesting that the Danubians were



FIG. XXXII.—DANUBIAN POTTERY AND CELTS.

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a peaceful peasant folk. Their flint and obsidian knives and composite tools containing small flakes are not unlike the Tardenoisean industry in type.

THE FIRST LAKE-DWELLERS.—In the lowest levels of the lake-dwellings traces of this culture have been detected in the pottery and stone axes, the “shoe-last celt” having been found at Lake Constance. The same domestic animals occur. Nevertheless, there are also indications that originally the villages were erected by a “transitional” people who had come under the influence of the first settlers on the banks of the Danube who tilled the soil with “shoe-last celts.” Thus they maintained themselves by hunting and fishing, and collecting wild fruits and nuts from the forests, in addition to practising agriculture on a small scale in clearings on the mainland. Like the Azilians, they painted themselves with red ochre, and wore boars’ tusks and bone pendants as ornaments. Their harpoons, perforators and scrapers of bone and staghorn resemble the earlier types, while their miniature flint implements resemble more closely the Tardenoisean industry. But they also used triangular celts of greenstones, such as jadeite, and copper was widely employed. An Azilian station is known to have existed a little to the south of Bâle, and it is very probable that the earlier round-headed inhabitants of the Alpine region were descendants of the men of similar type found at Ofnet in Bavaria (*cf.* p. 154), who had acquired the secret of domestication, agriculture and pottery-making from the long-headed Danubian peasants in Bavaria, and then settled in Switzerland, where they developed their new culture.

LATER LAKE-DWELLERS.—Subsequently a change in climate produced heavy floods, which caused the water in the lakes to rise so that the original settlers were driven from their villages. For a while the dwellings remained unoccupied, and then apparently they were occupied by a migration from the West, having a culture very inferior to that of the earlier

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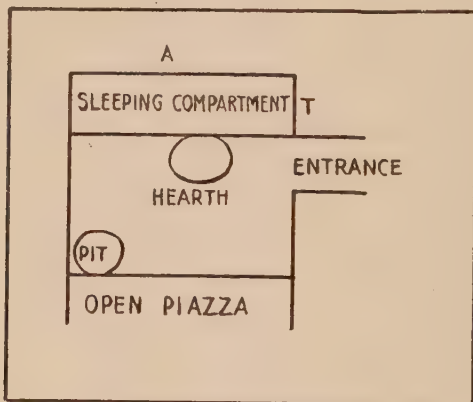
dwellers. Domestic animals are few in these deposits, and the pottery is coarse, showing some affinities with that of the North Mediterranean coast. The implements are made of opaque local flint instead of the transparent variety employed in the earlier period, a new type of wedge-shaped axe, perforated to contain a handle, making its appearance.

The western part of Switzerland, having no metal or other attractions for foreigners, remained unaffected by the rapidly developing civilizations of the Danube and Mediterranean; but the eastern portion, having metal ore and being on an important trade route, was much more progressive. Here stone battle-axes, characteristic of the Nordic warrior-folk, began to appear in due course, representing, perhaps, a migration from Northern Europe into Italy, where on Lakes Maggiore, Como, and Varese settlements occurred containing these weapons together with amber beads and small bronze daggers. Towards the end of the Stone Age some of the more venturesome spirits from the North seem to have made their way down the abrupt slope of the Alps to the Italian lakes, and fresh streams established themselves in the Bronze Age in the lower valley of the Po in pile dwellings on dry land. These settlements are called *Terramare*, from *terra marna*, or marl earth, the name given by the modern peasants in this district to the rich earth from these old villages, and used as a fertilizer. Since the construction of these dwellings resembles that of the Lake-villages so closely, it is probable that they were intimately related.

LAND HABITATIONS.—On the northern side of the Alps the Neolithic agriculturists made their habitations in clearings in the forests where the loess, or beds of sand formed during the dry ice ages, thinned the vegetation and provided excellent agricultural soil. But the absence of lakes on these loess lands made lake-dwelling impossible, and therefore they grouped themselves into large communities composed of small rounded huts 4 feet to 6 feet in diameter, made of poles and branches

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covered with dried mud or loam, and sometimes surrounded by boulders or palisading. These dwellings were sometimes divided into two compartments, consisting of a bedroom and kitchen, together with a funnel-shaped shaft, or "food pit," several yards deep, for the storage of provisions. An example of this type of village has been found at Grossgarth, near Heilbronn, in the Neckar valley, Germany, below the meadows which now replace an ancient lake, originally connected with the river, and surrounded by sand-covered (loess) hills.



GROUND PLAN OF THE DWELLING AT GROSSGARTH.
(After Schlitz.)

The chief house is a rectangular structure 13 feet by 16 feet, having an outer wall composed of posts with a wattling of twigs and plastered with clay. The inner surface had been coloured with a reddish-yellow pigment and frescoed with white and red geometrical designs. In the kitchen was a hearth and a "food pit," while at one end was the bedroom, raised several feet above the ground. In both compartments benches were cut out of the loess, and near by were the stables for the cattle and also granaries.

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CAMP DE CHASSEY.—Usually these villages were situated near running water, notably in the valleys of the Rhine, Rhône, Garonne, Loire, Seine, and Saône. Regions containing flint, obsidian, and metal ore also seem to have been selected for settlements in the Neolithic and Bronze Age. An extensive camp, for instance, known as Camp de Chassey, occurs between the Saône-et-Loire and Côte-d'Or in France, measuring no less than 2,442 feet by 673 feet, which was occupied from Neolithic times until the beginning of the Iron Age. Above the outer ditch an embankment 46 feet high was erected at each end, and within there are the remains of numerous hearths and habitations. Potsherds, polished stone implements, flints, and objects of bone and stag-horn abound, but it is exceedingly difficult to date precisely these camps from their contents.

As we have already pointed out, the distinction between the Neolithic and Bronze Age is very difficult to draw, and it has recently been asserted that "the Bronze Age was the Neolithic Age and the Neolithic the Bronze." There are no clearly stratified sites and geological deposits to help us in determining the age of these later stations as in the Palæolithic remains, and the matter is further complicated by the "Neolithic" method of constructing habitations having continued long after the appearance of metals, as in the case of the Terramare settlements in Italy. It is clearly outside the scope of this volume to enter into a discussion of the contentious question of chronology, and we have retained the term "Neolithic" without prejudice to describe the agricultural civilization that grew up at the dawn of the metal era merely because it happens to be the expression in most general use, and to coin a new word, or adopt one of the various suggested alternatives, would only confuse the general reader. Nor is it possible here to attempt an orderly reconstruction of the sequence of events throughout Europe during this very interesting but highly controversial period. It must not be supposed, however,

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that the culture about to be described belongs exclusively to the Stone Age in the sense in which earlier writers usually regarded the so-called Neolithic works, but to the first stage in the progress of civilization that immediately followed the introduction of agriculture, and which in some districts, notably in the Mediterranean region, coincided with the use of metal, while in other areas stone still prevailed.

AVEBURY.—Bearing these considerations in mind, let us return to our investigation of the early settlements. For this purpose we need not go farther afield than our own Downs, for, as everybody knows who has visited Wiltshire, prehistoric earthworks and monuments confront us at every turn in this district. About nine miles due south of Swindon lie the relics of the largest prehistoric monument in Europe, although all that remains of what was perhaps the first capital of England is a number of standing stones inside a circular wall of earth 15 feet above the ground level, enclosing an area about a quarter of a mile in diameter, and 29 acres in extent. Five times as great, that is to say, as St. Peter's, Rome, and large enough to contain a quarter of a million people! Today it only encircles the little village of *Avebury* with its 600 inhabitants, the rest being pasture land, on which is a great ditch, originally some 30 feet deep, and perhaps very much more, but now averaging about 15 feet inside the rampart. Near the inner edge of this was a circle of large rough upright stones, estimated at a hundred by Stukeley, an early investigator of the site, who also records that forty-four of these were standing in 1722. Within this large circle were two smaller double circles, of which the outer ring consisted of thirty stones, and each inner ring of twelve stones, 350 and 325 feet in diameter respectively. In the centre of the northern ring were three large stones, and in the southern a single upright huge stone, or *menhir*, as a single standing stone is called. Of all these, however, only eighteen stones remain, the rest having been used as building material for the houses and farms of the village.

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According to Stukeley, there was an avenue of menhirs in a south-easterly direction from Avebury to Overton Hill, near the village of West Kennet, following practically the course of the present road. This *alignment*, or series of standing stones arranged in a row, has now only nine of its menhirs in position, although others occur lying by the roadside. It is therefore not imposing like the classic examples of this kind of monument at Carnac, in Brittany, where more or less uninterrupted rows of large rough stones extend for over two miles. But originally the avenue must have resembled these alignments if, as has been suggested, it led from Avebury to a double stone circle, called the Sanctuary, on Overton Hill two miles distant. A second row is traced by Stukeley to Beckhampton, in a south-westerly direction, past the two "long-stones" known locally as the "Devil's Quoits," to a group of barrows beyond the Bath road, but this avenue is unknown to Aubrey, who described the district sixty years before Stukeley wrote, and it is therefore doubtful if it actually existed.

SILBURY HILL.—About a mile due south of Avebury a huge artificial earth mound, 130 feet high and 552 feet in diameter, covering in all $5\frac{1}{2}$ acres of ground, can hardly escape the notice of anyone going from Marlborough to Devizes by the main road (Fig. XXXIII.). This is *Silbury Hill*, described by Sir Richard Colt-Hoare in his classic work, *Ancient Wiltshire* (1819-21), as "one of the component parts of the grand temple at Abury" (Avebury). Although the two attempts to excavate it—one in 1777 and the other in 1849—have yielded no archæological results (probably because they did not penetrate below the ground level, where interments in such structures usually occur), there can be little doubt that it was erected by the same people who built the settlement. Moreover, it seems to belong to the class of ancient earthworks known as *Round Barrows*.

BARROWS.—Those who are familiar with our Down-

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FIG. XXXIII.—SILBURY HILL (after Colt-Hoare).

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land country must have seen many times the grass-clad, artificially made mounds of earth or rubble called *Barrows*. These curious structures, it will have been observed, vary in form, some being elongated, others conical or bowl-shaped. Furthermore, the excavation of the interior of many of these barrows has revealed a difference in internal construction in the two types, the more imposing elongated variety having frequently a series of lateral burial chambers proceeding from a corridor of stones, with a floor or portal on the outside, while the round barrows are normally only a conical pile of earth covering a single grave. If Silbury Hill is a glorified round barrow, its unusual size is very likely the result of its having had a special ritual significance in view of its proximity to Avebury, which settlement appears to have been connected with the worship of the sun.

The long barrows have generally been regarded as the older of the two varieties. This conclusion is based on the absence of metals in the elongated mounds, in contrast to the bronze articles and later types of pottery in the round barrows. Moreover, the long-barrow skeletons are long-headed, whereas the round-barrow men are either broad-headed, with occasional long heads, or else their remains have been cremated, a custom thought to belong essentially to the Bronze Age. It has therefore been suggested that the long barrows were the work of the long-headed descendants of the Palæolithic inhabitants of the West, while the circular tumuli were erected later by more advanced immigrants from Central Europe. But this explanation is less convincing now that the Neolithic culture seems to have been more inspired by the Bronze than the Stone Age, for barrow-building is just one of those things which seems to belong more naturally to the metal era than to the earlier culture. This will become more apparent if we cross the fields from Silbury Hill and examine the gigantic mound at West Kennet (Fig. XXXIV.).

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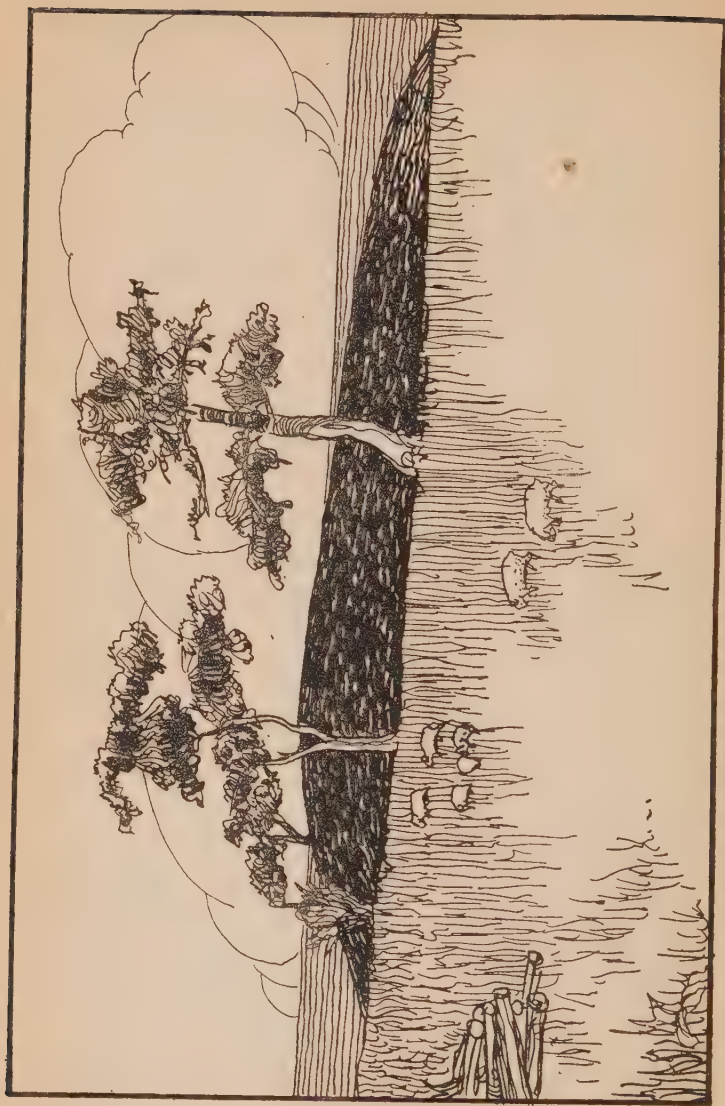


FIG. XXXIV.—WEST KENNET LONG BARROW.

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Here is a long barrow over 100 yards in length now, but originally of much greater dimensions. Around the outside stood a wall of upright stones placed at regular intervals. Within the mound was a sepulchral chamber about 60 feet from the east end, approached by a gallery of large stones on edge, weighing over a ton in each case. These were overlaid by flat stones, as lintels. In the chamber long-headed skulls occurred, together with flint scrapers having polished edges and other implements, coarse pottery, and fragments of a vessel ornamented with rectangular lines, recalling the drinking-cups known as *beakers* (Fig. XXXV.), found in Brittany and elsewhere on the Continent. These cups occur frequently in round barrows, and some archæologists think that they were the possession of a particular migration of round-headed people who first introduced copper into Western Europe, travelling down the Rhine to Denmark and Britain in search of metals, carrying their pots with them. But the cradle of this mysterious object seems to have been Spain, where it is found in early sites, and its ornamentation has been likened to that of the megalithic cave pottery. But whatever may have been its origin and racial significance, the presence of beaker ware in the West Kennet long barrow is suggestive of outside influence at some period of its history. Furthermore, some of the flint arrow-heads in the mound also have parallels in South-East Spain.

DOLMENS.—But it is the actual chamber that affords the most important evidence in this connection, composed as it is of large blocks of unhewn stone arranged in a manner resembling that of the tombs called *dolmens*, which occur along the coasts of the Mediterranean and Western Europe, notably in Spain, Portugal, and Brittany. These are formed of three or more upright blocks covered by a capstone, and often shaped rather like a horseshoe. Sometimes several slabs are added at the entrance with or without capstones, making a sort of vestibule. This, again, is

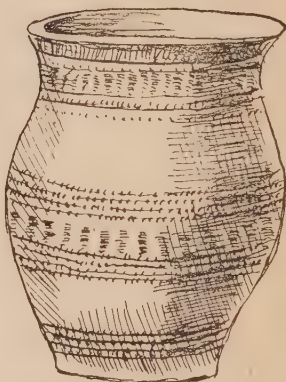


FIG. XXXV.—BEAKERS.

lengthened frequently into a definite corridor, and then it is known as a *passage dolmen*; or it may be a long rectangular gallery, or *allée couverte*, as the French say, in which the inner chamber is indistinguishable from the passage. Probably most of these passage graves were originally covered with an earthen mound, like the English long barrows, which are usually only dolmens concealed in a large mound of earth.

Closely related to these simpler sepulchres made of large blocks of unworked or slightly worked stone, *megalithic monuments*, as structures of this kind are called (Fig. XXXVI.), are tombs cut out of the rock and sometimes roofed by corbelled masonry. These resemble in some respects the Egyptian mastaba tomb. This consisted of an underground grave, often cut in the solid rock, approached by a shaft. Above ground was a small chapel containing a chamber, the *serdab*, in which the portrait statue of the deceased was placed to receive offerings. This is regarded by Montelius, Perry, Elliot Smith, and others as the prototype of megalithic monuments, the dolmen, according to Elliot Smith, being the remains of the serdab chamber that has survived the disappearance of the rest of the mastaba, though a relic of the tomb shaft is found in the passage leading to the chamber, just as traces of the portrait statue may be discerned in the human female figures sometimes seen on the stones—the so-called “dolmen deity.” Again, the large hole that is often found in one of the stones of dolmens in Northern Europe, except in Denmark, is explained, on this hypothesis, as the remains of the hole in the wall of the chamber containing the statue.

Other archæologists, however, reverse the process, making the dolmen the earliest and simplest form of the megalithic monument, an extension of the Palæolithic custom of burying in caves. In course of time other chambers and a corridor were added, it is supposed, till finally the more complicated tombs of the beehive and galleried type arose, as copper tools

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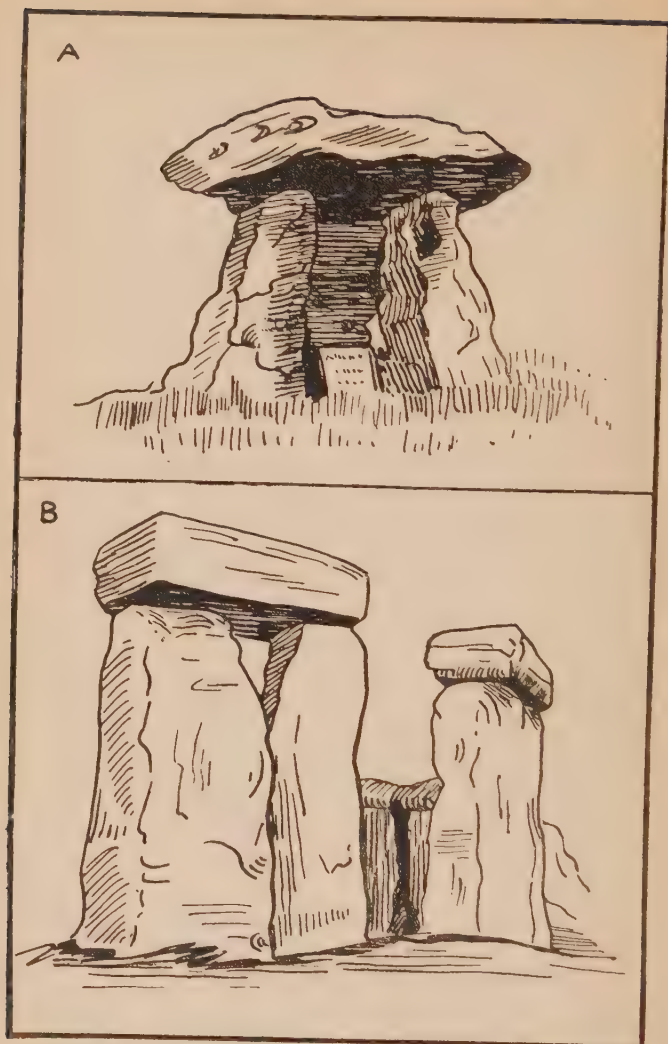


FIG. XXXVI.—MEGALITHIC MONUMENTS.
(A) Kit's Coty House, Kent. (B) Stonehenge trilithon.

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came into general use. Mr. Leeds thinks that Portugal was the original home of the dolmen, where it began its career in the Neolithic period, prior to the use of metals, and spread eastwards in the later Copper Age, while Peake traces it to the Persian Gulf.

The diversity of these views shows that no certain solution of the problem has yet been reached. Nevertheless, apart from the question of origins, expert opinion is tending to regard megalithic monuments as a product of culture contact either by a single race or through the communication of ideas. Thus, Dr. Fleure and Mr. Peake associate them with a broad-headed, square-jawed people, called the "Prospectors," because they were wandering about Europe in search of metal ores and other commercial commodities. They followed the great trade routes, it is supposed, and established themselves in commercial centres, such as Venice, Florence, Athens, and along the western coastlands into England, through Hampshire and Newbury in Berkshire, into Worcestershire, whence they crossed the Severn and went into Wales. Peake thinks they resembled in appearance Etruscan portraits and the sculptured figures on Sumerian reliefs, and that they set out from Sumer at the beginning of the third millennium B.C. The skulls associated with megalithic monuments, however, are by no means all of the type that this theory requires.

Mr. Perry, who was the first to call attention to the close relation between the distribution of megaliths and that of metals (particularly gold), amber, pearls, and certain other substances, suggests that the motive for the expeditions was the magical properties attributed by the Egyptians to gold and similar substances. In his opinion, the builders of the monuments made settlements on granite formations, as in Devon and Cornwall, because tin and gold were to be had in these districts. In Wiltshire, on the other hand, they chose the flint-producing chalk, and in Oxfordshire the neighbourhood of iron-workings. But there are

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many gaps in the correlation of dolmens and ancient mines, and Mr. Crawford thinks that the vegetation and the nature of the soil guided the people in their choice of a site. Whatever explanation is adopted, there are difficulties which at present have not been overcome. The absence of metals and the allied materials in the older megaliths has to be set against their distribution in certain areas containing ore or precious substances, which, despite awkward gaps, is too frequent to be a mere coincidence. Again, while dolmens are very numerous just where the Palæolithic caves abound, it is not easy to understand why men should go to all the trouble of erecting these structures when there were plenty of natural caves at hand. Surely it is inconceivable that huge blocks of stone would be collected together, often having been brought from a considerable distance, to build quite small structures unless there was some very special reason for so doing. If they were invented independently in different places they would hardly have particular features, such as window-like openings (portholes), which recur over the whole area of their distribution. Therefore, whether they be regarded as the work of a single race of actual settlers, or merely as the result of the communication of ideas from traders touching the coastlands, the dolmens of Western Europe suggest some kind of cultural diffusion along the natural sea route.

If this is so, the British long barrows must be connected with the megaliths of the Atlantic coast, while the round barrows probably indicate fresh inroads of invaders with broad heads from the East of Europe, who made their way up the Danube to Bohemia after the destruction of the second City of Troy about 1800 B.C., and thence passed down the Rhine and crossed to Britain, where they established themselves as a definitely Bronze civilization, having such distinctive customs as cremation. But they seem to have taken over a good deal of the religion of the earlier migration,

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for there is no evidence of stone circles in their original home, and it is probable that Avebury and Stonehenge, for example, belong to the same culture as the long barrows. Silbury Hill, on the other hand, may represent a combination of the two cultures—a round barrow transformed into a solar symbol.

TRACKWAYS.—The triangular tableland between the Pewsey valley and the pastures of North Wiltshire, measuring some ten to twelve miles on either side, probably represents the chief centre of the early civilization in England. In the middle stands Avebury and its adjoining monuments, connected with the surrounding district by what are thought by some to have been trackways (Fig. XXXVII.) from the Cotswolds, the Chilterns, the North and South Downs, Salisbury Plain, and the Dorset Downs. This particular culture seems to have been localized to a considerable degree in the Downland areas, the Peak district, and the Yorkshire Wolds, though it also recurs in Gloucestershire, Devon, Cornwall, and Wales; but there is a remarkable absence of megaliths and earthworks in East Anglia, where Neolithic flint-mining was extensively undertaken at Grime's Graves in Norfolk. Some think that it was to the high ground that the long-barrow folk were attracted, while Mr. Crawford is of opinion that they were guided in the choice of a settlement by the vegetation and water supply, but whatever may have been the determining factor, they seem to have tramped in large numbers over the Down country, since the fine dark-green grass produces innumerable daisies, and sometimes thistles in early summer, where their feet are thought to have made a lasting impression on the turf.

Mr. Hippisley Cox has described this trackway system in his interesting book entitled *The Green Roads of England*, and much may be learnt about the beginnings of English civilization by following the trails that he traces. If one spends a health-giving and profitable holiday in this quest, one finds that



FIG. XXXVII.—TRACKWAY ON THE DOWNS (after Colt-Hoare).

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sooner or later one arrives at Avebury, for this is the centre of the system, whither the green roads or ridge-ways radiate in all directions. Along the routes are flint implements, barrows, megaliths, pit dwellings and enclosures, stone circles and earthworks of various kinds and shapes, and sometimes the ruins of ancient mines. The course usually lies along the highest ground between the basins of the rivers, and it is studded by a series of camps about ten to twelve miles apart (*i.e.*, a day's journey), following the contours of the land encircling the hill-tops, like the Cissbury Ring on the South Downs near Worthing. Another huge earthwork is that known as Maiden Castle at Dorchester (Dorset), whence the Ickfield Way can be traced for 190 miles to Thetford in Norfolk. Some of these gigantic camps, however, appear to belong to the Early Iron Age when continued immigrations swarmed along the South Coast, particularly in the neighbourhood of Weymouth, bringing with them the great transitional Bronze-Iron culture which derives its name from the famous cemetery at Hallstatt near Salzburg in Austria. It was about this time that some of the earlier trackways began to fall into disuse, especially in South Wiltshire. Mr. Hippisley Cox regards the camps as an elaborate system of fortifications maintained by a central power for the protection of the tracks, which formed a national system of communications, but Mr. Massingham thinks they were essentially peaceful agricultural settlements. They were not, however, the homes of the people, for dwellings occur in the neighbourhood of the camps, usually on the sunny side of the hill, and contain the bones of such domestic animals as sheep, oxen, pigs, horses, and dogs, together with those of wolves and deer.

DEW-PONDS.—Near the habitations and earthworks shallow circular depressions have been observed which some archæologists think represent *dewponds*. This ingenious device consisted of an artificially prepared basin made in the chalk, lined with clay, and

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surrounded by rushes as a non-conductor of the sun's rays, so that, as the air laden with moisture passed over it at night, it was cooled and condensed into the pond. This method is still employed to water cattle on the Wiltshire Downs, and it is not improbable that some such scheme was adopted by early man to get the water he needed for his immediate household requirements, and the cultivation of the terraces or lynchets on the hillsides near the encampment, where probably he grew his corn. How far, however, any of these habitations and their lynchets can be assigned to the Neolithic culture is a matter of dispute among archæologists, but they were certainly common from this late Bronze Age onwards.

STONEHENGE.—Since Avebury appears to be the meeting-place of the earlier tracks on the chalk downs, it may have been the seat of government and the national temple, as Mr. Hippiusley Cox suggests, but the green roads also connect with another very important and imposing ancient monument about twenty miles to the south, on Salisbury Plain. Although comparatively few people are aware of Avebury and its historical significance, probably everyone who has visited "the plain" has seen its satellite, *Stonehenge* (Fig. XXXVI. B). For this great stone circle is the most famous of our English megalithic monuments, and it has been the object of wonder and speculation for the historian and folk-lorist in every age since its original purpose became obscured in the mists of time. The old Welsh legends ascribed it to Ambrosius Aurelianus as a memorial to the British chieftains massacred by the Saxons under Hengist, and some mediæval historians thought that Ambrosius himself was buried there, the Devil having been employed by Merlin to bring the stones from Ireland. More recently it has been connected with the "Druids"—a semi-mythological caste of Celtic priests supposed to have existed in England as well as in France in pre-Roman times.

As a result of the persistent researches of archæolo-

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gists, we now know that the monument really is a product of the cultural advance at the dawn of the metal era. Probably it is a trifle later than Avebury, but no trace of metal has been found in it except a copper stain on one of the stones, which hardly constitutes convincing evidence. Moreover, the round-barrow people do not appear to have been builders of megalithic monuments. It seems probable, therefore, that it was erected under the long-barrow influence, and taken over as a temple by the round-headed invaders.

Apparently it consisted originally of an earthworks 365 feet in diameter, formed of thirty hewn upright square stones, each supporting a lintel, and arranged in a circle 100 feet in diameter. These blocks are composed of a sandstone found in the valleys between Salisbury and Swindon called *sarsen*, which has given its name to the stones of the circle, within which was the actual temple, having first an outer circle of forty smaller stones of a peculiar material not found locally and shown to have been brought thither from Pembrokeshire. This encloses five groups of huge trilithons arranged in the shape of a horseshoe (Fig. XXXVI.B). Each trilithon consists of two upright stones with one lintel on top, and inside this group is another similar horseshoe, only of smaller stones, with a slab of sandstone known as the "altar stone" in the centre. In the circumference of the outer earthen rampart is a large flat stone having the ominous name of the "slaughter stone," while a little way down the avenue stands an upright isolated stone known as the "Friar's Heel." It is well worth while for those living in the south and west of England to run over to Stonehenge and work all this out on the spot, and if the journey is made by road, Avebury and its barrows can be seen at the same time. Really to be understood, ancient sites should be visited whenever possible.

What is the meaning of this remarkable circle? On an open tract of country like Salisbury Plain early man must often have seen the sunrise, and observed

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that on the longest day of the year it attains its extreme position, and then begins to decline. It is generally agreed that the builders of Stonehenge directed its axis as nearly as possible to the point on the horizon at which midsummer sunrise occurred at that date, and few would now deny that it was a temple used in connection with the worship of the sun and the heavenly bodies, even though it may also have been associated originally with the cult of the dead. Sir Norman Lockyer has worked out a very elaborate explanation of the orientation of the various parts of the circle in relation to Egyptian sun temples and their relations to agricultural festivals. Although a good deal of this has now been disproved, the gigantic monument stands in the middle of Salisbury Plain, with its avenue pointing to the rising sun, as a silent memorial to new ideas, aspirations, and influences that were largely responsible for the beginnings of civilization at the end of the Stone Age.

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